

The Newton Science Readers

First Book

By

W. FURNEAUX

Author of "Elementary Chemistry", "Animal Physiology"
"British Butterflies and Moths", &c.

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THE
NEWTON SCIENCE READERS.

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PREFACE.

This Series of Science Readers covers Scheme A of the Code. An endeavour has been made to provide lessons which will attract children and excite in them an interest in natural objects. The books may be conveniently used as *ordinary Readers*.

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THE NEWTON SCIENCE READERS.

BOOK 1.

MARY'S CAT.



1. "Come here, Pussy," said little Mary Williams, "I want to talk to you. Why do you lick your nice soft fur?"

2. But Pussy could not answer, so Mary's mother told her that Puss was washing herself.

Mary then gave her some milk, and watched her lap it up with her tongue.

3. When she had drunk all the milk, she licked off some that was on Mary's hand.

"Oh, how rough your tongue is!" said Mary.

4. "Yes," said her mother, "Pussy's tongue is covered with little hooks."

Mary now gave puss a bone, and watched her as she fed.

5. "Why does Puss hold her head on one side when she eats?" she asked.

6. "Come here," said her mother, "and I will tell you.

"Look at Pussy's teeth. You see she



has only very small ones in the front of her mouth.

7. "On each side she has large and sharp teeth; with these she bites and tears off

pieces of meat. She cannot chew her food as we do."

8. When Pussy had eaten all the meat, she licked the bone with her rough tongue, till it was quite clean.

"Look at the large black spot in Pussy's eye," said Mary.

9. "Yes," said her mother; "but we will take her over to the window where the



Skull of a Cat.



Cat's Head, with the Pupils of the Eyes closed and open.

sun is shining, and then the black spots will become much smaller and narrower."

10. She then told Mary that the black spot was really like a little window to let the light into the cat's eye.

11. "When Pussy is in a bright light," she said, "this little window is very small.

But when she goes into a dark place, the window becomes very large, and so lets in more light. That is why Puss can see in dark places better than we can."



Under Side of Cat's Foot,
showing the soft Pads.

12. Mary now looked for the cat's claws, but she could not find them. She saw only some soft pads on the bottom of her feet.



Cat's Foot, showing
the Claws.

13. "These pads," said her mother, "are so soft that Pussy can walk and run without making any noise; and when she is after a mouse, the mouse cannot hear her coming."

14. Just then Pussy put out her sharp claws, and stuck them fast in Mary's dress, and so pulled herself up on to the little girl's shoulder. There she curled herself up and began to purr.

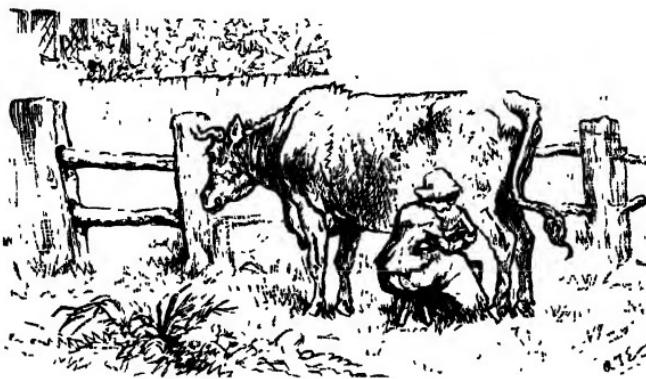
THE COWS IN THE FIELD.

1. Mary had two brothers, Jack and Percy. Jack was a year older than Mary.

Percy was a good many years older.

2. While Mary was playing with her cat, Percy came in and asked her to go with him for a run in the fields.

3. Mary was always glad to go with Percy, so she ran off at once to get her



The Cow.

hat on. Percy was very fond of his little sister, and taught her many things about trees and flowers and animals.

4. When they had gone a little way, they climbed over a stile, and came to a large field, where a number of cows were feeding.

5. At first Mary was afraid, but Percy told her the cows would not hurt her. Then he led her close to a fine red cow which was standing eating grass.

6. "Has the cow any teeth?" asked Mary.



Skull of Cow, showing the close-set cheek-teeth for grinding; the wide space between them and the front teeth of the lower jaw; and the absence of front teeth in the upper jaw.

"Yes," said Percy; "but why do you ask?"

"Because," said Mary, "she does not bite the grass, but breaks it off."

7. "She has teeth in the front of the lower jaw, but none in the front of the upper jaw," said Percy.

8. "In the upper jaw she has a kind of pad; and she holds the grass between the teeth and the pad, and then gives it a pull."

9. Percy then told Mary to look at the cow's horns, long ears, large eyes, and long tufted tail.



Cloven Hoof of Cow.

10. He also showed her the cow's hoof, and told her that it was split in the middle, so that it

spread out, and did not sink easily in soft wet ground.

11. He then led her to another cow that was lying on the grass. A number of flies

were buzzing round the cow's face, and there were some on her nose and eyes.

12. The cow shook her head to drive them off, and when a fly settled on her body, she lashed at it with her long tail.

13. "What is this cow eating, Percy?" said Mary. "She is not breaking off any grass."

"She is chewing the cud," said Percy. "But you do not know what that means; so I will tell you.

14. "When the cow feeds, she eats a great deal of grass, but she swallows it without chewing it much. Then, when she has had enough, she lies down.

15. "The food then comes back to her mouth, a little at a time, and she begins to chew it. When she has chewed it well, she swallows it again. Is not that a funny way of eating?"

THE USES OF THE COW.

1. As Percy and Mary were walking home, they saw a man driving some cows through the lane.

"Where are they going?" said Mary.

2. "They are going to the farm," said Percy. "The cows are driven home twice every day to be milked."

3. "We eat the flesh of the cow, do we not?" asked Mary.

"Yes," replied Percy. "The flesh of the cow is called beef. The fat is called suet, and is used to make puddings."

4. "But they do not kill the young cows, do they, Percy?"

"Yes, some of them. The young ones are called calves. If the farmer has more calves than he wants to keep, he sells some of them to the butcher, who kills them for food."

5. "You have told me about the flesh and fat," said Mary. "Do we make use of any other parts of the cow?"

"Oh, yes!" said Percy. "When you broke your new doll, I mended it with glue. Well, glue is made by boiling the hoofs of cows and other animals."

6. "What a useful animal the cow is!" said Mary.

"Yes, she is very useful," said Percy, "and I have not yet told you all her uses. Even the horns are useful; they are made into combs, knife-handles, and other things."

7. "Are the bones of any use?" asked Mary.

"Oh, yes!" said Percy. "The hard bones



of the legs are made into handles of knives; and men grind the soft bones to dust, which they mix with the soil. This bone-dust helps to make the plants grow."

8. Percy then told Mary to look at the mortar between the stones of the wall, to see if there were any hairs in it.

9. "I can see some," said Mary; "but why are hairs put into the mortar?"

"They are mixed with the mortar," said Percy, "to hold it together, and men often use the hairs of the cow for this purpose."

10. "The skin of the cow is made into leather after the hairs have been taken off."

"Well," said Mary, "I think a dead cow must be almost as useful as a living one."

JACK'S RABBITS.

1. "Oh, that's the postman's knock!" said Dick Wilson one morning. "It is a letter for Father. I'll run and fetch it."

He got the letter out of the letter-box, and on his way back he tried to read the name on the outside.

2. "This isn't Father's name," he said. "Just look, Mother."

Master Dick Wilson,

21 High Street,

Liverpool.

3. "Why, it's for me!" And Dick jumped for joy. Here was a real letter, and all for himself. He opened it, and found he could



read it all. It was a letter from Mrs. Williams, asking him to spend a few days at the farm.

4. Dick was up early next morning; and, after a long ride in the train, he saw his cousin at the station. After a drive of

about half an hour he was at the farm.

5. "Come and see my rabbits," said Jack almost at once.

"Oh, yes, that will be jolly!" said Dick in high glee.

"Come along then, and I will show them to you."

6. Jack led Dick up the garden, and pulled a carrot as he went. Soon they came to a neat and clean little hutch against the garden wall, under the shade of a tree.

7. The rabbits had heard Jack's voice, and were looking out between the bars of the hutch. They knew Jack would bring them something nice to eat.

8. There was a fine large rabbit, and two little baby ones, only a few weeks old. The little ones were standing upright on their large hind feet, so that they might better see their master who was so kind to them.

9. Jack asked Dick to stroke their nice soft fur, and to look at their long ears, bright eyes, and very short tail.

10. He then took them out of their hutch and put them on the ground.

"You see," said Jack, "they do not run like cats and dogs, but leap about on their

hind legs. They cannot run well, for their hind legs are so much longer than their front ones."

11. "Look at their toes, Dick. Their claws are not so sharp as a cat's claws."



Wild Rabbits.

"No, I suppose not," said Dick, "for they don't catch mice, nor do they want to climb trees after birds."

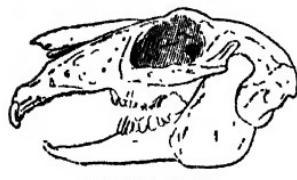
12. "What do you give them to eat?"

"I give them oats, bran, and green stuff. They are very fond of carrots. Just watch them eat this one."

13. Dick then watched them as they fed, and saw that they did not hold their heads

sideways as cats and dogs do. They bit off very small pieces with their front teeth.

14. Then Jack gently opened the mouth of the large rabbit, to show his friend its teeth. Dick saw only four teeth, and these were long, and had edges as sharp as chisels.



Rabbit's Skull.

15. But Jack told him to look at the back of the rabbit's mouth. He did so, and then he saw many smaller teeth; but these were not so sharp.

16. He told Dick that the front teeth were the biting teeth, and that the smaller ones were used for chewing the food.

THE DUCK POND.

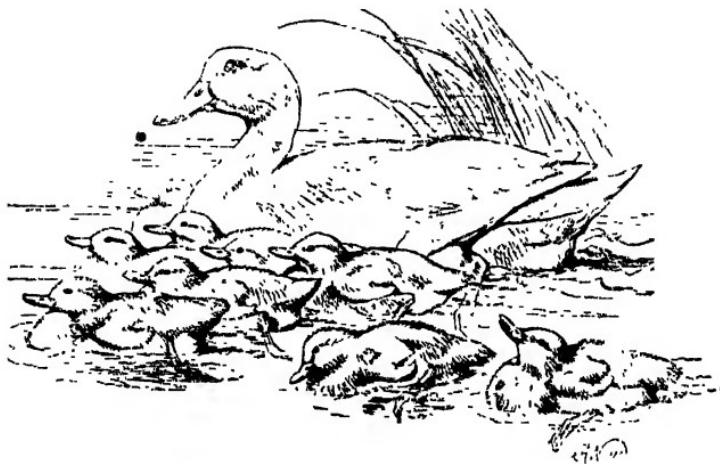
1. Jack next took Dick to see the ducks in the farm-yard. Some were swimming in a large pond, and every now and then Dick saw them push their heads under the water.

2. Some were in the mud at the sides of the pond, and were picking something out

of it with their bills. Some, he saw, were busy cleaning their pretty white feathers.

3. "Do the ducks ever fly away?" asked Dick.

"These ducks cannot fly," said Jack.



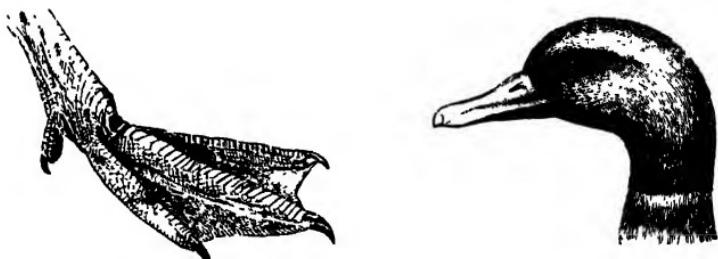
Duck and Ducklings.

"Their wings are not strong enough to lift their heavy bodies. But wild ducks can fly."

4. "They swim well, don't they?" said Dick.

"Yes, they can swim. Hens could not swim like that, for they have no skin between their toes as ducks have. My brother Percy told me that."

5. "Oh, there is a duck standing on its head in the water!" said Dick. "I can see nothing but its short tail and its feet."



Foot and Head of Duck.

6. "It is getting some food," said Jack. "Ducks find a great many worms, and weeds, and other things in the mud at the bottom."



"Now it's up again," said Dick. "But doesn't it get wet?"

7. "Ducks have a little oil on the feathers," said Jack, "and water will not stick to anything that is oily."

"Then don't ducks get wet when it rains?" asked Dick.

8. "No, the rain-drops run off their backs and do not wet them; but *hens* don't like water, because it sticks to their feathers, and makes them wet and cold."

MORE ABOUT THE DUCKS.

1. Jack now ran into the house to fetch a piece of bread for the ducks. When he came back, the ducks saw what he had in his hand. They hurried out of the water, and very soon all of them were round the boys.

2. Jack threw some crumbs to them, to let Dick see them feed.

"How quickly they gobble it up!" said Dick. "They don't seem to chew their food as we do."

3. "No, Dick; they do not chew it, for they have no teeth. But they have something just as good."

"What is that?" asked Dick.

4. "They have a gizzard," replied Jack, "which is a kind of bag in which the food is ground between two hard pads of flesh."

5. "But are the pads hard enough to grind up the dry crusts they are eating?" asked Dick.

6. "Well," said Jack; "it is not only the hard flesh that grinds the food. The food gets wet and becomes softer before it gets to the gizzard. The ducks also swallow sand with their food, and that helps to grind up the hard pieces."



A White Duck's Feather.

7. The two boys then began to walk round the pond. Dick picked up a fine white feather from the ground.

"How light it is!" he said.

8. "Yes," said Jack. "One part of the stalk is hollow; the other part is not, but is filled with some stuff which is as light as cork. That large feather came out of a duck's wing."

"Was it pulled out?" asked Dick.

9. "No," said Jack, "it fell out. Ducks, as well as other birds, cast off their feathers every year, and get new ones."

10. He showed Dick that the feathers were wide and flat, so that when the duck's

wings were closed, they would take up very little room.

11. He then took up one of the ducks, and opened its wing, to show his friend how large it was when the feathers were spread out.

12. And he told him to feel the very soft feathers, called "down", on the breast of the bird. Dick did so, and found that the breast feathers had no hard stalks.

THE SPARROW.

1. When Dick was tired of looking at the ducks, the two boys went to fetch some corn for the hens. They came back with their pockets full, and both boys threw out handfuls to them. The hens came running to pick the grains up.

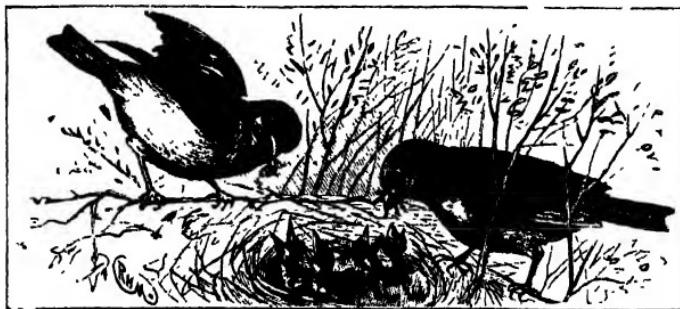
2. Some little sparrows also flew down from the roof of the barn, and ate some of the corn.

"The sparrows can fly well enough," said Dick.

3. "Yes," said Jack, "their wings are strong, and their bodies are very light."

"What makes their bodies so light?" asked Dick.

4. "Well," said Jack, "Percy told me that some of their bones are hollow, and that they have much air inside their bodies."



Sparrows feeding their Young.

5. "Do sparrows go into the water?" asked Dick.

"Not very much, Dick. They sometimes come down to the duck-pond to have a bath; but they cannot swim, because they have no skin spread out between their toes."

6. "Do their feathers get wet, Jack?"

"Yes, but the birds shake off most of the water after they have had their wash, and then they soon get dry in the sun. Sometimes they will also rub themselves in the dust to get dry."

7. "See how tame these sparrows are,"

added Jack. "They always come down to feed with the hens, and we never drive them away."

8. "Here is one so close to us," said Dick,



Drying their Feathers in the Sun.

"that I can see its toes, and the shape of its beak.

9. "It has four long toes with long claws, and one of them points backward."

"Yes," said Jack. "Percy says that is the kind of foot all birds have that perch on trees. With three toes in front and one behind they can hold on to a twig very well."

10. "Oh, I see!" said Dick. "The hind toe has the same use as my thumb."

"Yes, so it has," said Jack. "Now look at its beak, and you will see that it is not like a duck's beak."



Heads and Feet of Perchers.

11. "No, it is short, and round, and pointed," said Dick. "But why is it that shape?"

"Well, you see, sparrows do not get their food out of the mud as ducks do. They live on seeds, insects, and worms; and their beaks are just the right shape for picking up small things."

12. Jack then put a ladder against the barn, so that Dick might go up to see a sparrow's nest.

It was made of hay and straw, and in it were five little spotted eggs.

BABY FROGS.

1. Next morning Jack and Dick went down to the meadow, and Percy went with them. While Dick was picking some flowers by the side of a pond, he saw some little black things in the water. There was quite a crowd of them, and they were pushing each other about.

2. "Oh, look here, Percy!" he cried. "What are these funny little things, and what are they doing?"

3. "They are tadpoles," said Percy; and he lifted about a dozen out of the water in his hand.

4. "We have some in this pond every spring. They are really young frogs."

5. "Young frogs!" said Dick. "Why, they are not at all like frogs. I know what frogs are like. Frogs are not black; and they have four legs; but these things have *no* legs. Frogs, too, have no tails; but these have."

6. "Well," said Percy, laughing; "if you take home some of these tadpoles, keep them in water, and give them some food, you will see them change into real frogs."

7. "Have you seen tadpoles change into frogs?" asked Dick.

"Yes, I have seen them do so many a time."



Tadpoles.

8. "Tell me something about them," said Dick.

"Sit down on this bank, then; and I will tell you how they grow.

9. "Early in the spring time we see a great deal of a stuff like jelly in this pond. It is full of little black spots. It is really a number of frogs' eggs, all joined together.



Frogs' Eggs.

10. "After a few days the black spots get

longer, so that they look something like little black fishes; and you can see them moving inside the jelly. They are really the young frogs, and they eat holes in the jelly, and so get out into the water. They are funny little things with round bodies.

11. "Here they live together in little crowds, feeding on weeds and other things, till they become as large as those in the pond now.

12. "Soon you can see two little legs growing out behind their bodies, and when these have become long, two other legs grow on the front.

13. "Then they begin to look just like real frogs. They become lighter in colour, the body changes in shape, and the long tail slowly grows smaller and smaller, till at last it has quite gone.

14. "They are then no longer tadpoles, but frogs; and they come out of the water, and jump about, looking for insects to eat."



Changes of the Frog.

JACK'S PET FROG.

1. "Now, let us go home," said Percy, "and, Jack, you can show Dick the frog

which you caught in this pond last summer and keep as a pet."

2. When they reached the house, Jack led Dick into the garden. He went up to a corner which was shut off by a wide board.



The Frog.

There he lifted a large stone, and sitting still, in a little hole in the ground, was the pet frog.

3. It looked at Jack with its large and bright eyes, and did not seem at all afraid. Jack took it up in his hand, to show his cousin its large mouth, its very long hind legs, and its soft moist skin.

4. "Let me see its feet," said Dick.

"Look! It has five very long toes on its hind legs. When I spread them out," said

he, "you can see a skin between them like the skin between a duck's toes."

5. "Yes," said Jack; "frogs and ducks both swim a great deal, and they could not do so if they had not skin between their toes."

6. "Now look at the front legs," said Dick. "These are much shorter, and have only four toes, and there is no skin between them."

7. "Why are the hind legs so much longer than the front ones?" asked Dick.

"Because frogs do not *walk*, like horses and dogs," said Jack, "but jump with their hind legs; and they jump well, too, as you will soon see."

8. Jack then put his frog into its house, and gave it some insects and worms to eat. He placed an insect on the ground, and the frog took one long jump, and caught it so quickly on its tongue that you could hardly see how it was done.



Tongue of Frog extended to secure its prey.

Then with the help of its front feet the frog pushed the insect down its throat.

9. Jack next put the pet frog into a tub of water, to let Dick see it swimming. It swam very prettily. It jerked out its long hind legs, and spread out its toes so that you could see the skin between them.

10. Jack then put the frog back into its hole under the stone, where the sun could not hurt it.

A SNAKE!

1. The next day was to be the last that Dick was to spend at the farm. After breakfast he said to Jack, "Do let us go down to that pond again, for I should so much like to look at the little tadpoles again."

2. "Come along then," said Jack; "and we will take a jar with us, so that you may be able to carry some tadpoles home."

3. So off the boys went to the pond, running through the long grass.

4. All at once Dick saw Jack stop, and heard him shout to him to come quickly. When he came up, Jack pointed to some-

thing in front and said, "There's a snake, Dick; we will try to catch it."

5. As soon as Dick heard the word "snake", he wanted to run away, for he had heard dreadful tales about snakes.

6. But Jack told him there was nothing to fear, and he chased the snake among the grass until he caught it.

7. Dick stood a long way off, and he saw the snake, which was nearly a yard long, coiling itself round his cousin's arm. He heard it hissing loudly. "Won't it bite?" he asked.

8. "No, it is only a grass-snake; and grass-snakes hardly ever bite. Even if they do bite, they cannot hurt, for their teeth are so small."

9. "But snakes sting, don't they?"

"No, grass-snakes have no sting; and if you keep them in a case, they become

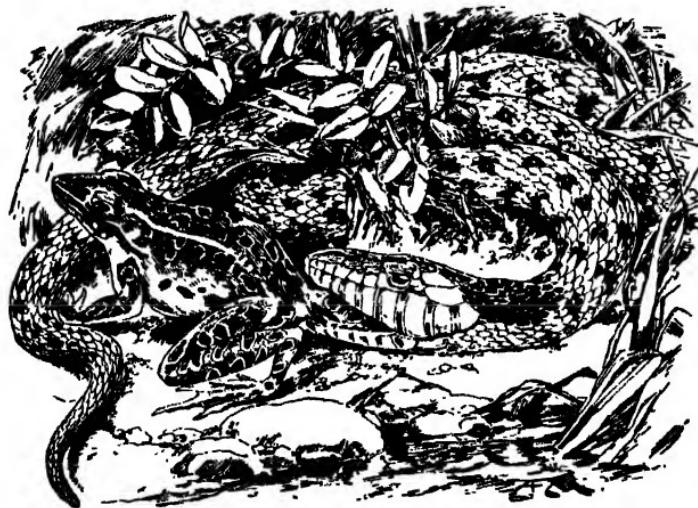


The Common Grass-snake.

quite tame. Come and look at our snake, Dick. Look at the shining scales that cover its body. Its eyes, too, are very bright; but it cannot close them, for it has no eyelids."

Head and Tail of Common Snake.

10. "How funny, Jack! Then it must sleep with its eyes open?"
"Yes, its eyes are always open."



Snake swallowing a Frog.

11. "What do snakes eat, Jack?"
They live chiefly on frogs. They swallow them whole, for their teeth are not large enough to bite their food in pieces."

12. "Then I should think they can only eat small frogs?" said Dick.

13. "Oh, no!" said Jack. "A snake can swallow a frog that is much thicker than its own body. Its mouth opens very wide, and its neck stretches as the frog goes down."

14. "I will put the snake down now, and you will see how easily it glides along among the grass."

15. Jack put the snake down and off it went among the grass, though it had no legs. It was soon out of sight. "I shall very likely see it again one day," said Jack, "for the snakes come to our dunghill every summer to lay their eggs."

"A snake lays about twenty eggs. They are white, and much larger than sparrows' eggs; and they are all stuck together."

16. The boys passed the day happily to-



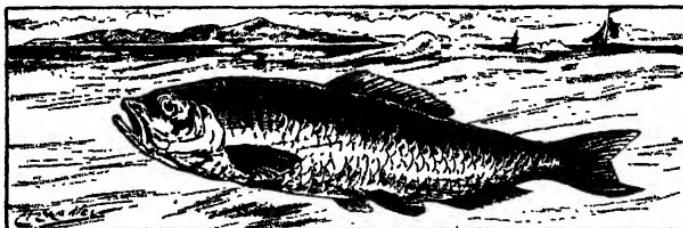
Snake's Eggs.

gether, but next morning Dick had to say good-bye and return to his own home.

THE HERRING.

1. Mary was fond of going to the kitchen to watch the dinner being cooked. One day, when they were to have fish, Mrs. Williams was in the kitchen, and Mary asked her to tell her something about the fish.

2. "These are herrings," said her mother.



The Herring.

"They are caught in the sea, where thousands of them swim about together."

3. "I could not live in the sea," said Mary.

"That is true," said her mother, "for you could not breathe under the water as fishes do. When you breathe you take air into your lungs, but fishes have no lungs."

4. "Then do they not breathe at all?" asked Mary.

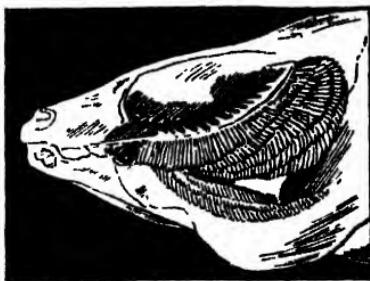
"Oh yes!" replied her mother; "they must have air, but they get the air from the water, for there is always some air in water. Look at these large holes at the back of the fish's head. If I lift up the covers over them, you can see the red gills by which the fish breathes."

5. "Have you ever seen a living fish in the water, Mary?"

"Oh yes!" said Mary, "I have seen Auntie's goldfish swimming about in a large glass. All the time I was watching them they were drinking."

6. "They were not really drinking, Mary," said her mother. "The water which they took into their mouths passed out again through the gills."

7. "The gills are red, for there is a great deal of blood in them. When water passes through the gills, the air, which is in it, goes from the water into the blood. Animals which have lungs breathe as you do; but those which have gills can only take air from water."



GILL OF FISH.

8. Mrs. Williams then began scraping the herring.

"What are you doing, Mother?" asked Mary, who was watching her.



Open Mouth of Herring.

"Has the herring any teeth?" asked Mary next.

9. "Yes, I will show them to you," replied her mother. She then opened the fish's mouth, and Mary saw a large number of very small and sharp teeth.

10. "The fish cannot bite its food into pieces as you do; the teeth are not large enough for that. They are only useful for catching and holding the things on which it feeds."

11. Mary then looked at the fins by which the fish swam. There was one on the top of the back; one below near the tail; one on each side near the head; and two very close together below the middle of the body.

12. She saw, too, that the tail was really a

fin ; and her mamma told her that all these fins were used for swimming.

JACK'S CATERPILLARS.

1. "Oh, look at all these little yellow things on this cabbage-leaf!" said Jack to his father one day.

"They are butterflies' eggs, Jack. If you keep them for a few days a little caterpillar will come out of every one of them."

2. "I'll keep them, then, and watch them every day," said Jack.

So he put them into a box, and placed the box in a shady corner of the garden.

3. One morning, a few days later, Jack looked, and saw a number of very small caterpillars walking about in the box. So he took it into the house and showed it to his father.

"Look here, Father," he said, "all the little eggs are broken, and these tiny things have come out from them. Do you see them creeping about?"

4. "Yes, they are looking for food, Jack," said his father. "You must give them

some cabbage to eat, and see that they have fresh food every day."

5. Then Jack put a small piece of cabbage-leaf in the box, and covered the box with a piece of glass. He fed the cater-



Caterpillars on a Cabbage.

pillars every day for some weeks, and they ate a great deal of food, and grew quickly.

6. After a while he took away the glass, and put a piece of muslin over the box, so that the caterpillars could get air as well as light.

7. Sometimes he would take one out to look at it. He liked to see it biting away at the edge of a leaf with its tiny jaws. He

also counted its legs, and found that it had six thin ones in front. Behind them there seemed to be ten very short but thick ones.

8. Sometimes a caterpillar would stop eating and look as if it were ill. But before long a funny thing would happen. Its skin would come right off, and show a nice soft new skin underneath. When it had changed its skin in this way, it would begin eating again and be as active as ever.

9. One day Jack saw three of his pets at the top of the box. They had again stopped eating. But this time they had fixed themselves by their tails, and tied themselves up by a very fine band of silk, which went round their bodies.

10. Jack asked his father what they were doing, and his father told him they were going to change, and that he must watch them every day. Next morning he saw one of them changing its skin, as he had seen some of the caterpillars do before.

11. But when the old skin was off it seemed to be quite a new kind of animal. It had now no legs, and Jack could not see its mouth or its eyes. His father said that it was now called a *chrysalis*.

12. All the caterpillars changed in the same way, so that in about a week he had a number of these funny things on the sides of his box.

A BUTTERFLY.

1. Jack's pets did not seem to change any more. They could not eat, and they never moved except to wag their tails. Yet he looked at them day after day, for his father told him that something very strange was going to happen.

2. And so it did; for one morning, while Jack was looking into the box, the hard skin of one of them began to split, and out walked a very funny creature.

3. It walked on to Jack's finger, and he carried it to his father to ask him about it.

"That is a butterfly," he said to Jack.

4. "A butterfly!" cried Jack. "It has very small wings for a butterfly!"

"Yes, so it has; but let it rest for a while, and watch it, and you will see another change."

* 5. Jack then took the queer creature into the garden and put it on the trunk of a

tree. It rested there, with its short wings hanging down. As he watched it he saw the wings curl up, and look worse than ever.

"I've never before seen a butterfly like that," thought Jack.

6. But he still kept watching it, and he saw the wings grow larger and larger, till they were as large as the wings of the butterflies he had seen in his garden. They were still very soft, and they bent as the butterfly moved.

7. The last time Jack looked at his butterfly he took it in his hand. He saw that the wings had become stiff and dry. It was a full-grown butterfly at last, and while Jack was looking at it, it spread out its pretty wings and tried to fly away. But Jack caught it.

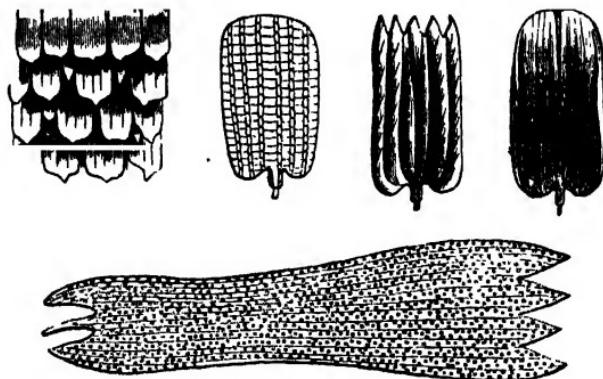
8. He carried it to his father, and when



A Butterfly just out of Chrysalis.

he opened his hands to show it to him he saw some white powder on his hand, and asked what it was.

"That powder," said his father, "is made



Scales from the Wings of different Butterflies, seen with the microscope.

up of very small scales from the wings of the butterfly, which are quite covered with scales."

9. Then he told Jack to look at the large green eyes of the butterfly. He also showed him the long thin tube by which it sucks up sweet juices from the flowers.

10. "It has only six legs, Father," said Jack; "and the caterpillars had sixteen. Where are the others?"

"The caterpillar had only six legs, my boy," said his father, "the other ten that

you speak of were not true legs. They are sometimes called *claspers*."



Cabbage Butterfly.

a, The eggs; b, caterpillar; c, chrysalis; d, the female butterfly.

11. Jack then let the butterfly loose and it flew away. In a few days all his pets had turned into butterflies, and he let them, too, fly away to get food among the flowers.

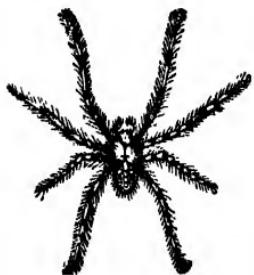
SPIDERS.

1. One evening Mr. Williams called Mary and Jack to him. "Would you like to

hear a story?" he said. "I can tell you one about a little boy I once knew whose name was Jim."

2. Jack and Mary thought they should like to hear about Jim, so their father went on:

3. "Jim was very fond of watching and



Garden Spider.

playing with spiders," he said. "He would often go out into the garden, catch a fine large spider, and put it into a large box with a piece of glass on the top.

4. "One day I saw him watching some spiders spin their webs, and I said to him, 'Why do you play with those insects, Jim?'

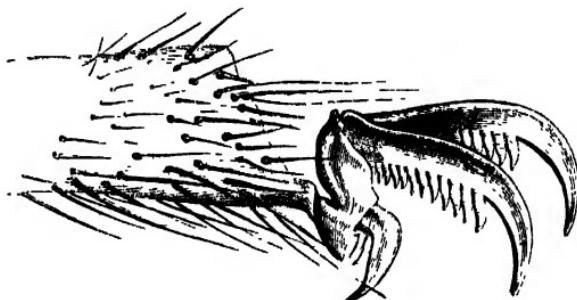
5. "He looked at me as if he thought me very foolish, and said, 'Don't you know that spiders are *not* insects? Insects have only six legs, but my spiders have eight.'

"And so they had—eight long legs, with short stiff hairs, and sharp claws.

6. "'I have kept insects too,' said Jim to me. 'At first they were grubs or caterpillars, but afterwards they changed to insects with wings.'

"But do not spiders also come from grubs?' I asked.

7. "'Of course not,' said Jim. 'Young spiders are just like the old ones, only very



Spider's Claw, seen with the microscope.

much smaller. But young insects are grubs, and do not change till they have done growing.'

8. "Then he showed me a pretty little ball of yellow silk in the corner of his box, and asked me if I knew what it was. I did not know what it was, so I asked him to tell me.

9. “‘One of my spiders made that,’ he said, ‘and it is full of eggs. I had one like it before, and scores of very little spiders came out from it and ran all over the box.’



10. “Jim took me into the garden, and showed me a very large spider’s web.

“It was very pretty, and was made of fine silk threads. Some of these threads



met in the middle of the web, and others went round and round.

11. "Just as we were looking, a fly flew into the web, and the sticky threads held it so fast that it could not get away.

12. "Then Mr. Spider, who was watching a little way off, rushed up to the poor fly. He rolled it round and round, spinning fine silk all the time; and the fly was soon quite covered with threads, so that it could not move.

13. "Then the spider bit the fly, and sucked out its blood till there was hardly anything left but its skin and wings."

THE SNAIL.

1. "While we were watching the fierce spider, Jim's father came over to us. He had in his hand a very large snail, which he had found on the garden wall.

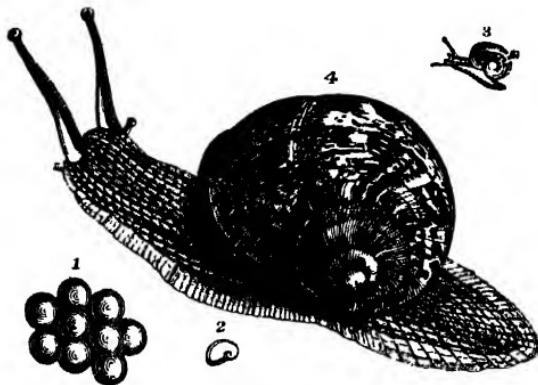
"'Here is a beautiful snail,' he said.
'Would you like to have it, Jim?'

2. "Jim was very fond of all kinds of animals, and he took the snail. He put it on a cabbage-leaf, and watched to see what it would do.

3. "For a time it was quite still, and we looked at its pretty shell, which was coiled round and round, and became smaller and smaller towards the top."

4. "'Oh, now it is moving!' said Jim. 'Let us watch it.'

"A soft body with a slimy skin was soon



The Garden-snail.

1, Eggs of snail; 2, Shell taken from egg; 3, Young snail; 4, Full-grown snail.

seen to poke itself out of the shell. Then four horns came out of the snail's head.

"It was very pretty to see the snail crawling on the leaf. Its moist body moved along slowly and smoothly, leaving behind it a streak of slime which soon became dry.

5. "'Look at its horns,' said Jim. 'Two of them are longer than the others, and have little round knobs at the end.'

“Then Jim’s father told us that the snail feels with its horns as it moves along, and that the little knobs on the ends of the longer horns are its eyes.

6. “Jim now touched one of the horns, and the snail at once drew it in.

“‘How funny!’ he said. ‘The eye has gone inside the horn, and the horn has been pulled right inside the snail’s head.’

7. “But the horn soon came out again, and the snail began to crawl onward. When it got to the edge of the leaf it began to feed, biting off little pieces of the cabbage.

8. “‘Has the snail teeth, Father?’ asked Jim.

“‘Yes, it has,’ replied his father. ‘It has hundreds of very small teeth, all in rows like the teeth of a file.’

9. “Jim now watched it closely, and saw the mouth on the under side of its head.

“He also put his ear close to the snail when it was feeding. He said he could hear the little teeth biting or scraping off the little pieces of the leaf.

10. “He made a house for the snail, and kept it as a pet, and gave it plenty of fresh cabbage leaves to eat. It slept all day,

and fed in the evening. But when the cold weather set in, it did not move, but slept day and night, and ate nothing till the winter was over.

11. "So that is my story about Jim," said Mr. Williams. "Perhaps some day you will see Jim."

THE CARROT.

1. Tom and Winnie Marsden were cousins of Mary and Jack Williams. Their father also was a farmer, but they lived far away on the other side of England.

2. One day Tom was in the garden helping his father to gather some carrots and other things for the next day's dinner. When his work was done, he took his slate and pencil, and made a drawing of one of the carrots.

3. He made it thick at the top, and more and more narrow as he got to the other end. There he drew it long and thin like a mouse's tail.

4. There were some little white threads coming out of the sides of the carrot, and

these he put in his drawing. He also drew the green stalks that grew out of the top.

5. Tom showed the drawing to his father, who told him that it was well done, and he said he would tell Tom about the carrots.

6. "The carrot," he said, "is a root. It grows downwards into the ground, while the leaves of the plant grow upwards into the air."

"But roots are not always red like this one, are they?" said Tom.

7. "No, roots are nearly always of a very light colour, and are often almost white."

8. "And they are not all of this shape, are they, Father? I saw you pull a root in the garden, and it looked just like a bunch of fine threads."



9. "You are right, Tom. Roots are of many shapes; but they all have the same use."

"How can that be?" said Tom. "Carrots are useful as food, but some roots are thrown away because we cannot eat them?"

10. "'True,' said his father, "I did not mean that all roots are of the same use to us, but that they are all of the same use to the plants. In the first place, the root fixes the plant in the ground. And then, you see, plants grow, as we do; and, like us, they cannot grow without food."

11. "How can they eat?" asked Tom.
"They have no mouths."

"True," said his father, "they have not mouths like ours. But look at the little white threads on the carrot."

12 "Yes, Father, I have drawn them on my slate; but of what use are they?"

"The ends of these little threads," replied his father, "are very soft, and through them the plant sucks up food from the ground."

THE TURNIP.

1. A few days after, Tom's father was taking him through the fields, when they saw some men and women hard at work.



At Work in the Turnip Fields.

"What are they doing, Father?" asked Tom.

2. "They are pulling turnips, Tom. See how they throw them into carts to take to market? We will walk over and watch them at their work."

3. So Tom and his father walked over the rough ground, between the rows of turnips, till they were close to the workers.

4. As they were going through the field, Tom saw that most of the turnips were only partly covered, and that some were half out of the soil.

"Is the turnip a root like the carrot?" he asked.

5. "Yes," said his father, "turnips are roots, and they take up food from the ground to feed the plant."

"But why do leaves grow on the top of the turnip?" said Tom. "We only want the root for food."

6. "Yes, but the root itself could not grow without the leaves which spring from it, for plants get food from the air as well as from the ground," replied his father. "And then I must tell you that the tops are often eaten by people, and sheep and cattle are very fond of them."

7. One of the workmen now spoke to Tom's father. He had heard what Tom said about turnips; so instead of putting it into the cart he threw a nice little turnip over for Tom to catch.

8. Of course Tom had seen plenty of turnips before, but this one was nice and fresh, and he liked the pretty green leaves.

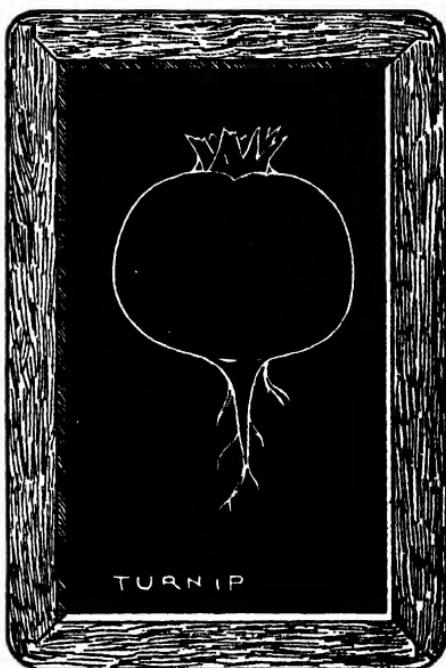
9. He took it home with him, and drew it on his slate as he had done the carrot.

10. He made it round, almost like a ball, but flatter on the top, and pointed at the bottom. At the bottom, too, he drew the little root threads which sucked up food for the plant.

11. "Now cut the turnip through the middle, Tom," said his father.

Tom did as he was told, and saw that all the inside was soft and very wet. There were no tough threads inside, like those you see in some stems and roots, but all was soft and juicy.

12. It was also covered with a skin, which
(x 219)



was quite dry outside, although the turnip was so wet within.

POTATOES.

1. "I want you to help me in the garden to-day, Tom; I am going to dig potatoes." This was what Tom's father said one fine summer's morning, as he took up his hoe, and handed a large empty bag to Tom.

2. It was Tom's summer holidays, and he was glad to help in the garden. He took the bag, and walked down the long garden with his father.

3. They soon came to a piece of ground with large plants, all in rows, and bearing flowers; and then they set to work.

4. Tom's father pulled one of the plants, and up it came out of the ground, with two or three potatoes clinging to it.

5. He then turned over the soil with his hoe. He found more potatoes, which had broken off from the plant when it was pulled up. These were all thrown over to Tom, who stood near, and Tom put them into the bag.

6. They worked on in this way till the

bag was full.' Then Tom took up one of the plants, and asked why it had two kinds of roots.

7. "It has only one kind of root," said his



The Potato Plant.

father. "Do you see these white threads running down from this white stem? Well, these are the roots of the potato plant."

8. "But are not the potatoes also roots?"

"Oh no, Tom! the potatoes which we eat are really swollen stems that grow under the ground."

9. Tom could not understand this. He thought that the parts of plants that grew.

under the ground must be roots. So his father showed him the different parts of the plant, and told him about them.

10. "This green stem," he said, "rises up above the ground; and on it grow the leaves and the flowers. These white stems grow underground. They look like roots, but they are not roots. They do not take up food from the soil as roots do, and they have buds, and that is why we call them stems."

MORE ABOUT POTATOES.

1. "Why do you call the potatoes stems, Father?" asked Tom. "They are not at all like the other stems of the plant."

"Yes, they are like the other stems in some things, for they do not take up food from the soil."

2. "But they have no buds," said Tom.

"Oh, yes! they have buds too," replied his father. "The *eyes* of the potato are buds."

3. "They are funny buds," said Tom; "I never saw any buds like them before."

"Come with me, Tom, and I will show you how these buds grow."

4. Tom's father then took him into a shed at the top of the garden, and turned some potatoes out of a sack. Tom picked one up and looked at it.

5. "Oh, now I can see why the eyes are called buds!" he said; "for here is something growing out of each of them. Would they go on growing, without being put into the soil?"

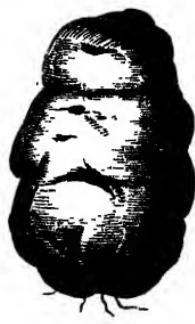
6. "Yes, they would for a time," said his father. "When the potato plant grows in the ground, the roots take up more food than is wanted to form the leaves and flowers.

7. "Then the food which the plant does not need for the leaves and flowers is used to form the potatoes, from which other plants will grow another year."

8. "But is there enough food in a potato to form a whole plant?" asked Tom.

"Oh, no! not nearly enough. The young plant feeds on the potato till its roots grow, and then it gets food from the soil.

9. "If it were not put into the soil, the plant would die."



A Potato.

"Did you get your potato plants from potatoes?" asked Tom.

10. "Yes, I cut the potatoes into pieces, with an eye in each piece, and then I put the pieces in rows in the ground. At first the young plants fed on the pieces of potato. But soon their roots became so strong that they could get enough food from the soil."

THE SUGAR-CANE.

1. An uncle of the Marsdens came to see them one day. "Come here, Tom," he said; I have something for you."

2. Tom ran over to him, and his uncle gave him a long stick.

"I brought that home in the ship," he said, "when I came home from India, for I thought you would like to have it."

3. Tom looked at the stick for a long time. He had never seen one like it before. It was more than an inch thick, and the outside was very smooth and shining.

There were joints in it, too; something like the joints that you see in a stem of grass or corn.

4. "What kind of stick is this, Uncle?" asked Tom.

"Look at the end of it, Tom, and see if you can tell me what it is."

5. Tom looked at the end, and said that



it was very much like a cane, for it was full of little holes.

His uncle then cut off a piece, and split it open; and Tom saw that the wood was in little thin bundles which ran along the cane from top to bottom. He also saw that the inside was moist and sticky.

6. "I will now cut out a piece from the middle," said his uncle, "and you shall taste it."



Sugar-cane.

"What, taste a stick!" said Tom. How can I eat a stick?"

7. But he did as his uncle told him, and he found that the stick was very sweet, and tasted as if it had been soaked in sugar-water. He could not guess what it was.

8. So his uncle told him that it was a piece of sugar-cane that he had brought

home from a far-off land, where it grew. Tom had heard about the sugar-cane, but had never seen a piece before.

9. "I should like to see the sugar-cane growing," he said. "What is it like?"

"It is like a very tall and thick grass," said his uncle. "It has a very long and straight stem, with leaves like large grass-blades, and a bunch of pretty flowers on the top."

MORE ABOUT THE SUGAR-CANE.

1. "Tell me more about the sugar-cane, Uncle," said Tom, as he climbed up on his uncle's knee.

2. "Very well, I will tell you some things about it. First, you must know, that the sugar-cane will grow only in places where it is very hot, far away from here.

3. "The people in these lands plant it out in large fields, and look after it. They often cut down a cane that they may suck out some of the sweet juice.

4. "When the canes are fully grown, they are cut down. Then they are crushed between rollers to press out the juice."

"What do the people do with the juice, Uncle?" asked Tom.

5. "They let it run into large pans," said



From Harper's Magazine.

Cutting Sugar-cane.

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his uncle, "and boil it till it is very thick. Then they let it cool, and as it gets colder, little grains of sugar are formed."

6. "Does it all turn into sugar?" asked Tom.

"No, not all of it," said his uncle. "What does not turn into sugar is called

treacle, and is sent away in large casks. The sugar, too, is sent away to places where it is wanted. But it is not then like the sugar we eat. It is very dark, and has to be made pure and white before it is used."

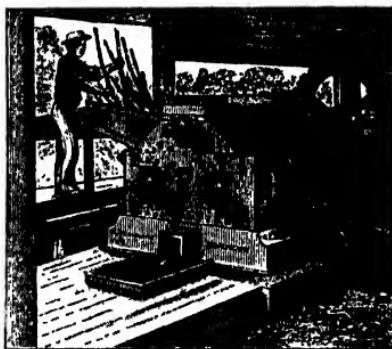
7. "Do we get sugar from any other plants, Uncle?" said Tom.

"Oh, yes!" replied his uncle; "nearly all plants have sugar in them, but in most of them there is very little, and we do not try to get it out."

8. "In some plants sugar is found in the root, in some in the stem, and in some in the fruit."

"I should think that the sugar-cane was a tall plant, Uncle; for this piece of the stem is very thick."

9. "Yes," said his uncle; "the sugar-cane grows very high. It is fully twice as tall as I am. And it grows very fast too, as most plants do in very warm countries."



Sugar Mill.

"Has it any branches, Uncle?" asked Tom.

10. "No," replied his uncle; "it has only the one long stem, with leaves and flowers. I hope that, some day, you will be able to see the sugar-cane growing. But you are too young yet for me to take you to the lands where it grows."

A LOG OF WOOD.

1. Tom had an elder brother named Bob. One day they took a long walk in the fields and lanes. They were beginning to feel tired, when they came to an open place in the road, where trees had been cut down. There they rested for a time, sitting on one of the logs of wood.

2. "Look at all those rings and lines in the wood," said Tom, as he pointed to another log close by.

"Yes, I see them," said Bob; "and I was just thinking of what my teacher told me about them a few days ago."

3. "I wish you would tell me what he told you," said Tom.

Bob was very glad to let Tom see how

much he knew, so he began: "Of course," he said, "you know that this log is a part



of the stem of a big tree that has been cut down, and you can see three parts in it.

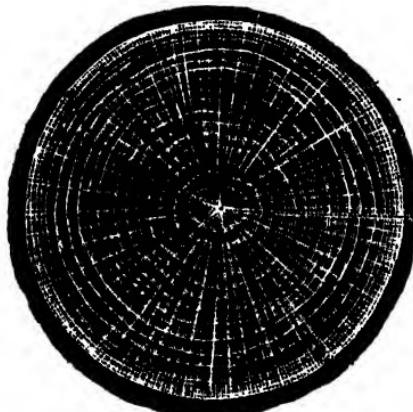
4. "Here, in the middle, is some soft stuff which you could easily pick out with a knife, or even with your nail.

5. "This is called the pith of the stem, and you see much more of it in young stems than you do in old ones."

6. "The outside of the log is the bark. It is lighter and softer than wood, and is often very rough and very thick. Then all the rest of the log is made up of rings of wood, as you can see."

"But what makes the wood grow in rings?" asked Tom.

7. "Well, you see," said Bob, "the wood does not grow at all in the winter.



Trunk of Oak-tree cut across, showing the Rings.

"In the spring-time it grows quickly, and makes a ring of wood that is not very hard; but in the autumn it grows slowly, and a harder ring is then formed."

8. "But is the new wood formed under the bark?" asked Tom.

"Yes," said Bob. "The new wood grows under the bark, so that the bark is pushed out a little every year."

9. "Then," said Tom, "if a new ring of wood grows every year, I suppose you could tell how old this log is?"

"Yes, Tom; let us count the rings."

10. Then the two boys counted them. They began in the middle, and counted more than a hundred rings before they came to the bark. So they knew that the tree must have been more than a hundred years old when it was cut down.

A CABBAGE.

1. One day Tom was out with his father cutting cabbages. One of the cabbages had such a tough stem that Tom could not get his knife through it, and he had to pull it out of the ground.

2. "Look carefully at the cabbage you have pulled, Tom, and tell me what are the parts of it," said his father.

Tom looked at it closely and then said, "It has a root, a stem, some leaves, and a heart; but I do not see any buds or flowers."

"Yes, it has a bud, too," said his father.

3. "Where is it?" asked Tom. "I cannot see it."

"The heart is a bud, Tom. Can't you see it is?"

"I don't think I have ever seen any other buds like it," replied Tom.

4. "Oh, yes, you have!" said his father;



The Cabbage.

"only they were not so large."

"There are two kinds of buds, Tom. One kind opens out into flowers, and so is called a *flower-bud*; the other kind forms leaves

and branches. The cabbage is a *flower-bud*."

5. "But the heart of a cabbage does not open at all," said Tom.

"There you are wrong," said his father. "All these hearts would open if we left them in the ground long enough."

"Then why don't we leave them?" asked Tom.

6. "Because they would not be so good for food then," said his father. "They would be tough, and would not taste nice. Come with me, and I will show you some

cabbages that have no hearts now, though they had them once."

7. Then Tom went with his father to another part of the garden, where there were a number of very tall plants, with long stalks and yellow flowers.

8. "There, Tom! these are cabbages without hearts," said his father, pointing to them.

"But they are not like cabbages."

9. "Still they are cabbages, Tom, and they once had hearts like the others. But the hearts opened, and grew into stalks, and leaves, and flowers. And now you see why we call them buds. They open just like the buds of other plants, and stalks with flowers grow out of them."

MORE ABOUT THE CABBAGE.

1. Tom wished to know more about the cabbages, so he asked his father why he left them in the ground sometimes, till they grew tall.

2. "Because I want the seed," said his father. "If I leave the plants in the ground, flowers will grow on them, and will

give me seeds from which I shall get new plants next year."

3. Tom now went into the house with his father, to help him to carry in the cabbages. Then his father said, "Come here, Tom. I



Strange Cabbages.

will show you what the inside of the heart of a cabbage is like."

4. He then took a large knife, and cut a cabbage right through the middle.

"Now you can see the inside of the bud," he said. "It is made up of a number of leaves, all folded up close together."

5. "Are all buds made up of folded leaves?" asked Tom.

"Yes," said his father; "but the leaves are not always folded in the same way as these are. Now, look at one of the leaves."

6. As he said this, Mr. Marsden pulled off one of the large leaves on the outside of the cabbage, and gave it to Tom.

"You see," he said, "that it has a short and thick stalk, from which many branches spread all over the leaf."

7. "Yes," said Tom. "I see that the stalk runs quite to the top of the leaf, and all its large branches nearly to the edge."

"Well," said his father, "the thick part that runs up through the middle is the rib of the leaf. The thin branches are called veins."



The inside of a Cabbage and a Cabbage Leaf.

8. "What is the use of the veins?" asked Tom.

"The veins are made up of little tubes, which take the food of the plant into all parts of the leaf. If you break a thick stalk, you will find something in it like little strings. These are really little tubes through which the sap of the plant flows."

9. "Are there no tubes in the soft and thin part of the leaf?" asked Tom.

"There are none like these," replied his father. Then he told Tom to tear a piece of the thin part.

Tom did so, and found that there was nothing in it like strings, but that it was all soft and tender.

THE ONION.

1. "Now," said Tom's father, "we must go out into the garden again, for I want to get some onions."

So away they went again. They walked down the long path, till they came to a bed quite full of nice large onions, all ready to be pulled.

2. "Shall I pull some?" asked Tom.

"Yes, Tom," replied his father; "and put them into this basket."

3. Tom pulled up a dozen or two of the onions without stopping. Then he looked at one over and over again. There seemed to be something about it he could not understand.

4. "What is the matter, Tom?" said his father.

"I can't understand this plant," replied Tom. "I do not see any leaves, but only a few soft stems."

5. "Ah! you are wrong, Tom," said his father. "This plant has leaves."

Saying this, he cut off one of the leaves of the onion plant, and showed it to Tom.

6. "There, Tom," he said. "This is not a stem, but a leaf. It is not flat as most leaves are, but just like a pipe, pointed and closed at one end."

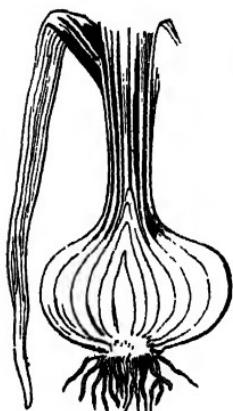
7. "Then where is the stem of the plant?" asked Tom.



The Onion.

"There is no real stem yet. But if I let the plants grow for a few weeks longer, a stem will rise, and flowers and seeds will grow on it."

8. "And what is the large round part of the plant which we eat?" asked Tom.



An Onion cut through.

"We will cut it open with a knife, Tom." Mr. Marsden quickly cut the onion down the middle, and asked, "Now can you see what it is?"

9. "It looks something like a bud, with thick leaves all close together," said Tom.

"Yes, you are quite right. The onion which we eat is really a bud; and if it were left in the ground it would open out and form leaves, stems, and flowers."

10. "I used to think the onion was a root," said Tom.

"Yes, Tom, many people think it is a root, but they are wrong. These long and thin things below it form the root; and it is these which suck up the food from the ground."

PICKING FLOWERS.

1. One day Tom and his sister Winnie went down to the meadow to pick some flowers.

2. They first played about among the tall grass, and then they each picked a fine bunch of wild flowers. They had buttercups and cowslips, and many other pretty flowers. When their hands were quite full, they sat down to make them up into a nice bunch.

3. "I wish father were here," said Tom; "for he would tell us all about the flowers."

Just as he said this, he saw their father coming through the gate. Tom ran to him and asked him to come and tell about the flowers. So his father sat down beside the children and asked which flower they would like best to know about.

4. "Tell us something about this one," said Winnie, holding up a fine large buttercup.

5. "Well," he said, "the buttercup is made of many parts, and each part forms a ring. Outside, there is a ring of little green leaves. Count them, Winnie, and tell me how many there are."

6. Winnie soon counted them, for she had learned to count in the village school.

"There are five," she said; "and they are all the same size."

7. "That is right, Winnie; and what is the colour of the next ring of leaves?"

Winnie said they were yellow. Tom said that they were the same colour as butter.

8. "Yes," said his father; "they are yellow, like butter, but much brighter."

"See how they shine!" said Tom. "They are as smooth and bright as brass buttons."

9. "Yes, and now count the leaves in this ring also, Winnie," said her father.

Winnie did so, and found that there were five of these also.

10. Then their father showed the children that there was a ring of little stalks, with heads on them; but of these there were so many that Winnie could not count them.

11. "There are no more rings," said Tom.



A Buttercup.

"No," said his father, "but you see a number of little green things all close together in the middle of the flower. These are little cases, and inside each one there is a seed."

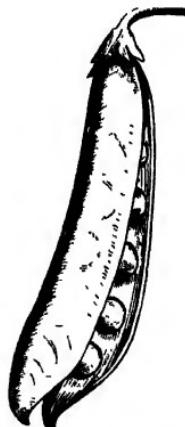
THE PEA-POD.

1. One fine day in the summer, Mrs. Marsden sent Tom into the garden to get some peas for dinner. He picked enough to fill his basket; and when he brought them in, his mother told him to take all the peas out of the pods.

2. He took the pods, one by one, and pressed them between his finger and thumb. When he did this, the pod split open with a pop, and then he could see the peas all in a row.

3. They were all on the back of the pod, and each one was fixed in its place by a little green stalk.

4. His father came in before he had shelled them all, and Tom was glad, for he wished to ask him something about the peas.



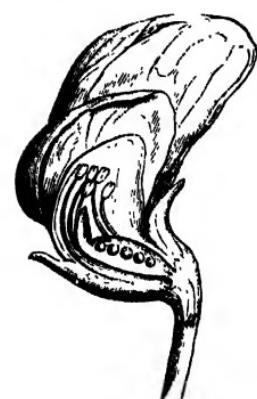
Pod of Pea split open.

5. "Father," he said, "you have told me about roots, and stems, and leaves, and flowers; but I don't know what these are. Are they flowers?"

6. "Oh, no, Tom! Did you not see some pea flowers on the plants in the garden?"

"Yes," said Tom. "They were very pretty flowers, and looked somewhat like butterflies.

7. "Well, go out and get me one, Tom, and I will then show you what a pod is."



Flower of the Garden Pea
cut through the centre.

Tom soon came back with a flower from a pea plant, and his father showed him the green part outside, and then a larger white part which was in shape something like a butterfly.

8. Tom then pulled off some of the white part, and there, in the middle of the flower, was a little green thing like a pod, with a bundle of stalks round it.

9. "There, you have found the young pod, Tom. When the white part of the flower dies, and these little stalks all fall off, the

pod goes on growing till it is as large as those you picked."

"Are there any peas in it now?" asked Tom.

10. "Yes, the young peas are there, but so small that you can hardly see them."

Tom's father then cut the young pod open with a sharp pen-knife, and Tom could just make out the tiny little peas.

11. "What are these little green leaves at the bottom of the pod?" asked Tom.

"Those are the leaves that were once on the outside of the flower," said his father. "They do not die with the other parts of the flower."

THE CHERRY.

1. After dinner, Mrs. Marsden gave Winnie and Tom some cherries.

"What long stalks they have!" said Tom.

2. "Yes," said his father; "those stalks once had pretty flowers on them."

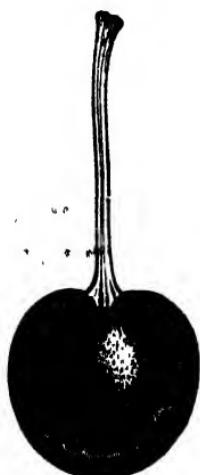
"Where are the flowers now?" asked Tom.

3. "This cherry is part of the flower," said Mr. Marsden; "but the other parts have died."

"What a strange flower it must have

been," said Tom, "with a large soft cherry like this in the middle of it!"

4. "No, Tom; the cherry was very small while the flower was growing. It became larger after the rest of the flower had fallen off."



Cherry cut through,
showing the stone.

5. "The middle part of a flower ripens after the other parts have died, and then we call it the fruit."

"But you did not call the pea-pod a fruit," said Tom.

6. "No, it is true I did not," replied his father; "but it also is a fruit."

Then he told Tom to take a cherry, and see how many parts he could find in it.

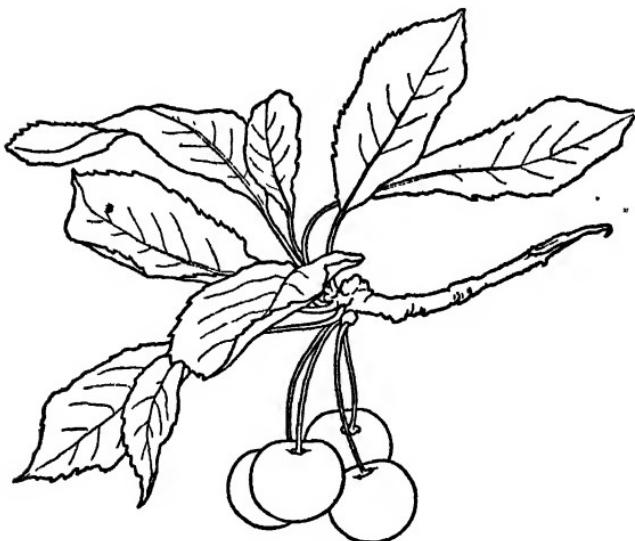
7. "I see three parts," said Tom, after opening the cherry. "There is a thin skin outside, then the soft and juicy part, and then the stone in the middle."

8. "Quite right, Tom. Now see how many parts there are in the stone."

Tom then broke open the stone, and said he could see two parts—a hard shell, and a little kernel.

9. "I see something more," said his father.
"I see a thin skin all over the kernel."

"The stone is the seed of the cherry,"



A Bunch of Cherries.

he added. "If you put it into the ground, a plant will grow from it."

10. "How does the seed grow in the ground?" asked Tom.

"When it is in the moist ground, the hard shell soon gets soft, and breaks open, and then the little plant grows out of the kernel."

11. Tom thought he would like to put

some of the seeds in the ground, so his father took him into the garden, and helped him to plant some of the cherry-stones.

NUTS.

1. In the autumn, Tom and Winnie went out into the lanes to gather nuts and blackberries.



Hazel-nut.

2. They saw a great many nuts. Tom had a stick with a crook handle, and with it he pulled down the boughs of the trees

to let Winnie pick the nuts off.

3. When they had filled their basket, they sat down on a bank to rest, and ate some of the nuts and berries. Winnie pulled the nuts out of their pretty green husks, and then gave them to Tom to crack.

4. "Oh, look here!" said Tom, after he had cracked one of the nuts. "This one is not ripe. Look how small the kernel is."

5. Winnie looked, and there lay the ker-

nel right in the middle of the shell. All round it there was a bed of very soft white stuff.

6. Tom opened another one. The kernel was larger, and the soft white bed was not so thick. Then he cracked one that had a nice large kernel, which quite filled the shell.

7. "There is no soft bed for the kernel of this one," said Winnie.

But Tom looked closely, and saw that there was a bed for this one too, only it was brown, and it had become very thin. It formed a thin but soft lining inside the hard shell.



Hazel-nut cut through.

It formed a thin but soft lining inside the hard shell.

8. Winnie took the kernel, and stripped off its brownish skin. Then it split into two parts, which were smooth and shining on the inside.

9. "Father says that many seeds split in that way," said Tom. "Acorns, beans, and peas do when you press them."

10. "But is this kernel a seed?" asked Winnie.

"Yes," said Tom. "Father says that the

nut is the fruit of the nut-tree, and the kernel inside is the seed."

11. "Will it grow?" asked Winnie.

"Yes, if you put it into the ground. And it will become a tree, with nuts on it, just like these trees in the hedges."

12. After the children had eaten as many nuts as they wanted, they started homeward. They made up their minds to plant some nuts in the garden when they got home, and to watch them grow into trees.

THE SAND-PIT.

1. One day Tom and Winnie went for a walk over the hill. There was a great deal of loose gravel on the hill, and it soon made them tired. So they came home by the road in the valley.

2. On their way they came to an open gate. They both walked through, and there they saw three or four men in a large pit, digging up sand, and throwing it into carts.

3. While the men were digging, down fell a great deal of sand on one side of the pit, for the sand was very loose.

“What are you going to do with that sand?” said Tom to one of the men.

4. “We are going to take it to the builder,” said the man. “He will use it to make mortar.”

5. Tom then took up a handful of the sand, and looked closely at it.

“Why, it is full of little stones?” he said.

“Yes,” said the man. The little stones and grains of sand were once parts of big stones. But those were knocked about by the water until they were broken into small pieces.

6. “But what water did this?” asked Tom.

“Well, I don’t know just what water it was,” said the man, “for it was all done long ago, years and years before we were born. “It might have been the waves on the sea coast, or the water of a large river.”

7. “But how is it that the water is not here still?” asked Tom, who wished to understand all about it.

“I can hardly tell you; but I know that many changes like that have taken place.”



River-worn Stone.



Wave-worn Stone.

8. The man then began to rub some of the sand between his two hands.

"Won't it cut your hands?" said Tom.

"Oh, no!" said the man.

9. "But I can see," Tom went on, "little shining pieces in the sand that look just like glass, and glass cuts."

10. "That is quite right, but if you look close, you will see that all the little pieces of sand are rounded. That is how we know they have been worn by moving water.

11. Tom and Winnie had now to go home; and they took with them some sand for the birds and chickens."

GLASS.

1. When Tom and Winnie reached home, they told all about the sand-pit, and what they had heard from the man who was working there. Then their father told them many other things about the sand, and the way it was formed.

2. He told them, too, that sand was used in making glass. Tom thought that was

strange, "For," said he, "glass is so clear that you can see through it, and sand is not clear."

3. Then their father showed how glass is



Glass-blowing.

made. He put some soda on the end of a fine wire that would not easily melt, and then melted the soda in a gas flame. He next put a little sand on the soda, and

melted it again, and it soon began to look something like glass.

4. Last of all, he blew a very hot flame on it, and the sand and soda melted together, and formed a pretty little clear glass bead.

5. "Do they always use sand and soda for making glass?" asked Winnie.

"They always use sand," said their father; "but there are many kinds of glass, and soda is not used in making all the kinds."

6. Then he said, "Now, I want you to tell me something about glass."

And he put two or three pieces of glass on the table before them, that they might look at them.

7. "Oh, look!" cried Tom. "This thin piece will bend!" And so it did; but when Winnie tried to bend it she forced it a little too much, and it snapped in two, and the sharp edge cut her finger.

8. "It is as sharp as a knife," she said.

"Yes, and as *hard* as a knife, too," said her father.

"Is it really as hard as steel?" asked Tom.

9. "Yes, it is *harder* than steel; and that

is the reason why you cannot cut it with a knife."

Mr. Marsden then showed that a piece of glass, if put in a gas-flame, could be made quite soft. He put a thin piece in the flame, and it soon became so soft that it could be bent and twisted without breaking.

10. He also told them that glass could be melted in a hot fire till it looked almost like water.

A PIECE OF CHALK.

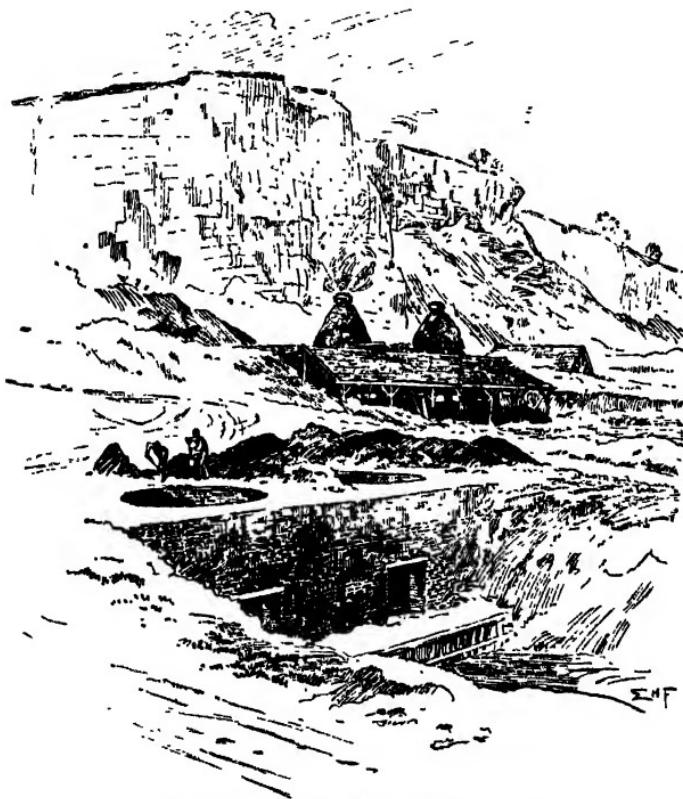
1. It was a very fine day, and Tom and Winnie thought they would go along the green lane that runs by the bottom of the hill.

2. When they had walked about a mile from their home, they came to a very narrow path between trees and shrubs. Here they sat down. Soon they heard some men at work behind the trees, and they thought they would go and see what they were doing.

3. When they came to the end of the
(M 219)

narrow path, they found themselves in a large pit.

The sides of the pit were formed of high



Chalk Quarry and Kilns for burning the Chalk.

white rocks. They saw men digging out large pieces of the white stone, and throwing it into a cart.

4. Tom asked one of the men what was

the kind of stone they were digging, and the man told him it was chalk.

Tom had never seen large rocks of chalk before. He had only seen the sticks of chalk which the teacher used in school for writing on the black-board.

5. So Tom picked up a piece to see if he could write with it. Of course there was no black-board in the chalk-pit, so he tried the chalk on the wheel of the cart, and wrote his name there.

6. Winnie picked up a piece, too, and scratched it with the nail of her finger to show Tom how soft it was. She said her father had told her that it was much softer than wood.

7. She said also that when the teacher used the chalk in the school-room to write on the black-board, little pieces were rubbed off the chalk, and it was these little pieces which made the writing.

8. Tom put a piece of the chalk in his pocket to take home, and he asked one of the workmen what he was going to do with all the chalk he was digging out of the hill and throwing into the cart.

9. The man told him that it was all to be

burnt in a large fire to make lime. " You will perhaps learn more about it some day," he said.

CLAY.

1. The next time Winnie and Tom went out for a walk, they passed through the brick-yard, where men were making bricks. Some of the men were digging clay out of the ground, and others were taking it away to be made into bricks.

2. The children picked up a few small pieces of the clay, to see what it was like. Some of it was dry and hard, and fell to pieces when they knocked it. But some was wet and soft, and could be pressed into any shape.

3. "Let us make some things with the soft clay," said Winnie. So they both sat down on a bank to try what they could do.

4. Tom made a horse's head. It had two long ears, two holes for its eyes, and two smaller holes for its nose. He made a deep cut with his knife for its mouth.

5. "That is very good," said Winnie, "and now I will see what I can do."

She first rolled a piece of clay into a round ball between her hands, and then cut it in two with Tom's knife. Then she took one half, and made it hollow just like a cup.

6. "Now let us see if my cup will hold water," she said. And they went over to the place where the men were working, for there was a stream of water there.

7. She filled her little cup with water, and the water did not run through the clay.

They then went back to the bank, and Winnie made the other half of the ball into a saucer.

8. "There is no handle to your cup," said Tom.

9. "I will soon make one," said Winnie; and she rolled a little piece of clay between her hands till it was long and thin. Then she bent it like the handle of a cup, wetted the ends with water to make it stick better, and fixed it on the side of the cup.

10. "We will go home now," said Winnie, "and show father and mother what we have done."

ABOUT A JUG.

1. When Tom and Winnie got home, they



showed the things they had made; and their father and mother thought they had

done very well. They told the children that all the cups and saucers, and plates and jugs in the house were made of clay.

2. "But how do they make them hard?" asked Tom.

"That is done by baking the clay," said his mother. "The clay is worked into shape while soft and moist, and then it is baked hard in large ovens."

3. Winnie now poured some water into her clay cup, to show that it did not run through.

"The water would run through if you gave it time," said her father; "for the clay is full of very small holes."

4. "Will the water run through after the clay is baked?" asked Tom.

"Yes," said his father; "for it will still be full of very small holes."

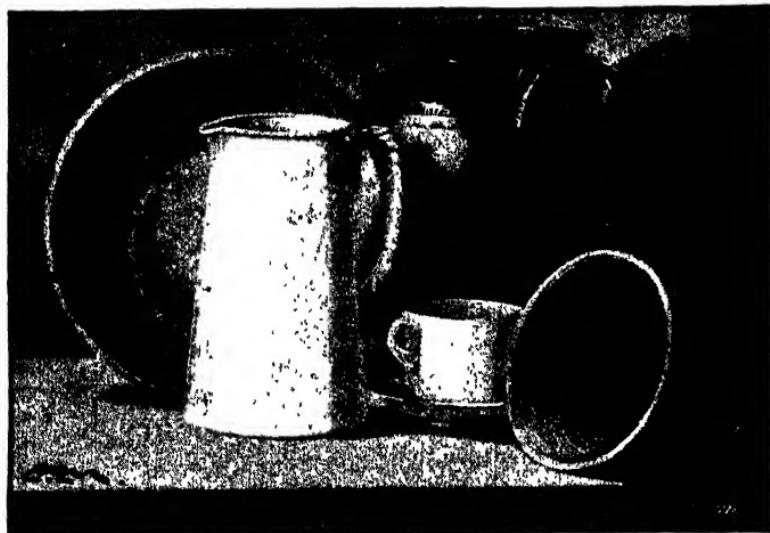
5. "But water does not run through this jug," said Winnie. "See, it is full of water, and yet it is quite dry on the outside."

"Quite right, Winnie," replied her father; "and I will show you how that is."

6. He then brought a flower-pot from the garden, and asked Winnie and Tom to look at it closely.

"The flower-pot is rough," said Winnie; but the jug is very smooth."

7. "Now I will put a cork in the hole in



Earthenware—Articles made from Clay.

the bottom of the flower-pot, and then half-fill the pot with water," said her father.

8. He did this; and the inside of the pot, above the water, soon began to grow wet, and the wet crept slowly up the sides. After a time, too, the water came through to the outside, making it also wet.

9. "Is the flower-pot made of baked clay?" asked Tom.

"Yes," said his father. "Both the flower-

pot and the jug are made of baked clay."

10. "But how is it that the water will run through one and not through the other?" asked Winnie.

11. "Because the jug has been covered with a thin coat of glass," said her father; "and there are no holes in the glass through which the water can run."

SLATE.

1. When the summer came, Winnie was asked by her aunt, Mrs. Williams, to spend her holidays with her cousins.

She was put into the train, and, after a long journey, arrived at the station, and was driven to her aunt's farm.

2. Her cousins, Percy, Mary, and Jack, were all glad to see her, and the first day of her visit Percy took them all for a walk to a place where there was a pit, big enough to put all the farm in.

3. In it there were many men. Some were digging out a hard kind of stone. Some were piling the pieces of stone up; while others, again, were taking them away in trucks..

"What are those men doing with the stone, Percy?" asked Winnie.

4. "The stone is slate," said Percy, "and the pit is called a quarry. The men are



Slate Quarry in Wales.

digging the slate out, and taking it off to the railway."

"What will they do with so much of it?" she asked.

5. "Most of it," said he, "will be sent away to towns, where it will be used for the roofs of houses and for other things."

6. "This is the kind of slate we write on," added Jack. "All the slates we use at our school come from this pit."

"We write on slates, too, at our school," said Winnie; "but I did not know where they got them from."

7. "Let us go down," said Percy, "and look at the slates." Away down they went, and when they were in the quarry, Percy took up a thick piece of the slate, and struck it with a hammer.

8. "See," he said, "it will split into thin straight pieces one way, but not in any other way."

Jack had a piece of pencil in his pocket, and with it he wrote on one of the slates.

9. Percy then told him that the pencil was softer than the slate; so when he drew it over the slate, little pieces of the pencil were rubbed off and left on the slate, and in that way the writing was made.

"That is how chalk makes marks on the black-board," said Winnie, who remembered what she had learned when she and Tom visited the chalk pit.

10. When they got back to the farm, Mary took her cousin into the yard, and showed her the tank of water. It was made of large thick slates, held together by iron bolts.

LEAD.

1. The next day Mary and Winnie went into the farm-yard to see the great slate tank again, and Jack went with them.

2. While they were there, writing their names on one of the big slabs of slate, the water began to run into the tank through a large pipe.

"What is that pipe made of?" asked Winnie.

3. "I think it is made of lead," said Mary.

"Why do people use lead for making pipes?" said Jack.

"I don't know," said Mary. "But I am sure Percy can tell us."

4. Saying this, she ran and called to Percy, who was at work in the yard. Percy came over to them at once, and Jack asked him why lead was used for water-pipes.

5. "Because lead bends easily," said Percy at once. And he pushed the pipe that hung over the top of the tank to show that he could bend it.

"I thought water-pipes were always made of iron," said Winnie.

6. "Well, iron is sometimes used," said Percy, but an iron pipe cannot be bent, for iron is very hard.

7. Then Jack said that the lead had almost the same colour as the slate. But Percy told him that, when quite clean, lead is more like silver.

8. He took out his knife, and scraped the dirt off a part of the pipe, and it became as bright as a new sixpence.

"I have a piece of lead indoors," he said. "Come in with me and I will show it to you."

9. They went into the house, and Percy took his piece of lead out of a box. It was a flat piece, and he cut from it some little chips to show his cousin how soft it was. He was also able to bend it with his hands.

10. Mr. Williams saw what they were doing, and gave them some little round shots, smaller than peas. The shots, he said, were made of lead.

11. He then put one on a hard stone, and hit it with a hammer. He only gave one blow, but that made it quite flat, and yet it did not break. He also rolled some of

the shots on a sheet of clean white paper. They were so soft that they made black marks on the paper.

12. Then Jack took his piece of lead, and wrote his name on the paper.

"Now look," said his father, "and I will show you something more."

13. Saying this, he put some lead in an old iron spoon, and held it over the lamp for a short time. The lead soon melted, and he poured it out on a flat stone. There it cooled very quickly, and, as it grew cold, it became hard again.

BLACK-LEAD.

1. The next evening, Mary and Winnie were sitting at the table, drawing houses and trees on pieces of paper. After a time Winnie dropped her pencil. It fell on the floor, and the point broke off.

2. "That is funny," said Winnie. "The lead we used yesterday would not break, but my lead pencil breaks very easily."

"I know how that is," said Mary. "Your pencil is not made of lead."

3. "Then why do they call it black-lead?" asked Winnie.

"Because it writes like lead, and looks like it," replied her cousin.

4. Then Mary's father, who was sitting



near, said, "Black-lead does look something like lead, but it is quite another sort of thing. Come here, and I will show you that it is not the same as lead."

5. He took Winnie's broken pencil, and cut away the wood with his pen-knife till

he could see the black-lead. He then cut the black-lead, and as he did so a black dust fell down on the paper.

"You see how easily it breaks into pieces," he said.

6. Taking a small piece of pencil out of his pocket, he split it down the middle



A Pencil split open to show the Lead.

with his knife, and took out the thin stick of black-lead which was inside it.

7. "Now try if this will bend, Winnie," he said, as he passed the black-lead over to his niece.

Winnie took it, and as soon as she tried to bend it, it snapped in two quite easily.

8. "Now, hammer a piece on this stone, Winnie."

Winnie did as she was told, and the black-lead was at once broken into little pieces.

9. "Now, you see," said her uncle, "that black-lead is not lead, even though it looks something like it."

"But what is the black-lead we use to make our stoves black and bright, Uncle?"

10. "The same kind of thing as we use for writing," said her uncle. "It is not really lead, though we call it so."

11. He then sent Jack for a piece of black-lead, and showed the children how it would write. He also showed them how easily it could be broken into pieces.

SODA.

1. When Mary and Winnie had done their drawings, they went into the kitchen, where the servant was cleaning the milk-cans.

"Why do you use soda, Jane?" asked Winnie.

2. "I could not clean the cans well without soda," said Jane. "The milk makes them greasy, and soda helps to get the grease off."

3. "Father one day showed Tom and me how to make glass with sand and soda. Soda seems to be used for many things," said Winnie. "I wonder if Percy could tell us about it."

They went to the parlour and found Percy. He at once came with them to tell them what he could.

4. "Look at this large piece of soda," said Mary. "It has flat sides, and looks like glass."



"It breaks quite easily, too," said Winnie, as she hit it with a piece of iron, and broke it up into small pieces.

5. "Run and get a glass, Mary; we will put

some of the soda in water," Percy went on.

Mary did as she was bid, and they put a few pieces of the soda into the glass with some water.

6. "Oh, look!" said Winnie, "the pieces are getting smaller."

And they both watched the soda, as the pieces grew smaller and smaller, until, at last, they were quite gone.

7. "Where has it gone, Percy?" said Winnie.

"The soda has not really gone," said he. "It is still in the water."

"But I can't see it," replied Winnie.
"How do you know it is there?"

8. "Just taste the water," said Percy,
"and you will soon find out."

Winnie tasted the water, and could then, from the taste, tell that the soda was in it.

9. Percy told Mary to get another glass, which he filled with some of the hot water which Jane was using to clean the cans.

"Now put some soda in this glass," he said, passing the glass of hot water to Winnie.

10. Winnie did so, and they all watched it. They saw that the soda grew smaller

much more quickly than it had done in the cold water.

11. "Can you get the soda out of the water again?" asked Winnie.

"Yes," said Percy. "I will show you how to do it."

He then put some of the water from the glass into a small saucepan, and placed it on the fire.

12. The water soon began to boil. When it had all boiled away, there was the soda at the bottom of the saucepan.

13. Winnie and Tom Marsden stayed at their uncle's farm till the end of the holidays. They had many a merry game with their cousins, and they learned many things.

14. Before they went home they made their cousins promise to come and see them in the winter, and their aunt told them how glad she had been to have them, as they had been such good children. She said she would like them to come again next summer.

SUMMARY OF LESSONS.

LESSON 1.—*Mary's Cat.*

Fur.—The soft fur keeps the cat warm. She licks the fur to keep it clean.

Tongue.—Her tongue is rough, so she can lick all the little bits of meat from a bone.

Teeth.—The teeth in front of the cat's mouth are very small. The teeth at the sides of the mouth are large and sharp, and with them she tears her meat.

Claws.—Her claws are sharp. She uses them for holding her prey, and also for climbing.

Eyes.—The cat's eyes grow larger in the dark. She can see in the dark better than we can.

LESSON 2.—*The Cows in the Field.*

Ears.—The cow's ears are long.

Eyes.—Her eyes are large.

Teeth.—The cow has no teeth in front in the upper jaw, but she has a pad instead. She has teeth in front in the lower jaw. She holds the grass between the teeth and the pad and breaks it off.

Tail.—The cow's tail is long. She drives off the flies with it.

Hoof.—The cow's hoof is split, so it spreads out and keeps her from sinking in soft places.

Horns.—The cow has long horns.

Chewing the Cud.—The cow first swallows the grass without chewing. She then brings it up again in little balls and chews it.

LESSON 3.—*The Uses of the Cow.*

Milk.—We drink the milk of the cow, and we also make butter and cheese from it. Cows are milked twice a day.

Flesh.—We eat the flesh of the cow. We call the flesh beef. We call the flesh of a young cow veal. Young cows are called calves.

Fat.—We call the fat of the cow suet. We use it to make puddings.

Hoofs.—We make glue from the hoofs of the cow and other animals. We use the glue for mending things.

Horns.—We make combs and other things with the horns.

Bones.—We make knife-handles from the long bones. From the softer bones we make bone-dust, to help to make plants grow.

Skin.—We make the skin into leather for boots and shoes.

Hair.—We mix the hair with mortar to hold the mortar together.

LESSON 4.—*Jack's Rabbits.*

Fur.—Rabbits have soft fur.

Ears.—They have long ears.

Tail.—Their tails are very short.

Legs.—Their hind legs are much longer than their front legs. So rabbits do not run like dogs and cats, but leap about on their hind legs.

Teeth.—Rabbits have four sharp teeth in front, with which they bite off small pieces when they feed. They have small teeth at the back with which they chew their food.

Food.—Rabbits eat oats, bran, and green stuff. They are very fond of carrots.

LESSON 5.—*The Duck Pond.*

Flying.—Ducks cannot fly, because their wings are not strong enough to lift their heavy bodies.

Swimming.—Ducks have skin between their toes, so they can swim well.

Diving.—Ducks dive to pick up worms, and weeds, and other things on which they feed, from the mud at the bottom and sides of the pond.

Getting Wet.—Ducks' feathers do not get wet, because they have a little oil on them.

LESSON 6.—*More about the Ducks.*

Teeth.—Ducks have no teeth, so they gobble up their food whole; they cannot chew it.

Gizzard.—Ducks have a gizzard. The gizzard is a kind of bag in which the food is ground between two hard pads.

Feathers.—The duck's feathers are very light. Part of the stalk of the feather is hollow, and part is filled with light stuff.

Wing-feathers.—The wing-feathers of the duck are wide and flat, so that when spread the wings are a good size, and when closed they take up little room.

Breast-feathers.—The duck's breast-feathers are very soft. They have no hard stalks, and are called "down".

LESSON 7.—*The Sparrow.*

Wings.—Sparrows have strong wings, so they can fly well.

Body.—Their bodies are light, because they have much air inside, and their bones are hollow.

Toes.—Sparrows have four long toes with long claws. One toe points backward. With this and the other three they can hold on to a twig.

Beak.—The sparrow has a short, round-pointed beak; just the right shape for picking up the seeds, insects, and worms on which it lives.

Nest.—The sparrow builds its nest of hay or straw.

Eggs.—The sparrow lays little spotted eggs.

LESSON 8.—*Baby Frogs.*

Frogs' Eggs.—The little black spots seen in the jelly-like stuff floating on ponds in spring are frogs' eggs.

Tadpoles.—The spots grow larger and larger. Then the little tadpoles eat their way out.

What they look like.—Tadpoles are black, have a tail and no legs, so they do not look like frogs.

Their Food.—Tadpoles feed on weeds and other things.

Their Changes.—They grow larger. Two little legs grow out behind, then two in front. Then the tail grows smaller. Their colour grows lighter. They become little frogs and leave the water.

LESSON 9.—*Jack's Pet Frog.*

Eyes.—The frog has large bright eyes.

Mouth.—The frog has a large mouth.

Skin.—The frog has a soft moist skin.

Hind Legs.—Its hind legs are very long. Each hind leg has five long toes on it, with skin between them.

Front Legs.—The frog has short front legs, with only four toes each. It uses the front legs to put its food in its mouth.

Food.—The frog lives on insects and on worms.

How Frogs Move.—Frogs do not run; they jump on their hind legs. They also swim a great deal.

LESSON 10.—*A Snake!*

Teeth.—Grass-snakes have very small teeth. They seldom bite, and they swallow their prey whole.

Scales.—Their body is covered with shining scales.

Eyes.—Grass-snakes have bright eyes, but being without eyelids they cannot close their eyes.

Legs.—Snakes have no legs, but they can move very easily and quickly among the grass.

Eggs.—They lay about twenty eggs. The eggs are white, are larger than sparrows' eggs, and are all stuck together.

Food.—Grass-snakes live chiefly on frogs. A snake can swallow a frog much thicker than its own body.

LESSON 11.—*The Herring.*

Where Caught.—Herrings are caught in the sea, where they swim about in thousands together.

Scales.—The herring is covered all over with scales.

Gills.—Fishes have no lungs, so they do not breathe as we do. They pass the water through their gills, and the air in the water passes from the water into the blood in the gills.

Teeth.—The herring has a great many small sharp teeth. With these it can hold the things on which it feeds, but cannot chew them.

Fins.—The herring has a number of fins. The fins are used for swimming.

LESSON 12.—*Jack's Caterpillars.*

Butterflies' Eggs.—The little yellow things often seen on a cabbage-leaf are butterflies' eggs. Put them into a box and watch them till the caterpillars come out of the eggs.

Food.—Feed the caterpillars every day with pieces of cabbage. They will eat a great deal and grow very quickly.

Legs.—Caterpillars have six thin legs in front, and what look like ten short thick ones behind.

Change of Skin.—They change their skin several times. At these times they stop eating and are ill, but they become active again.

Chrysalis.—The caterpillar changes into a chrysalis, and then it seems quite another kind of animal.

LESSON 13.—*A Butterfly.*

Chrysalis.—When the hard skin of the chrysalis splits, a butterfly comes out.

Wings.—The wings of the butterfly look at first very short. Then they grow large and become dry. The wings are covered with small scales.

Eyes.—The butterfly's eyes are large and green.

Mouth.—Its jaws form a long tube or sucker, with which it draws the sweet juices from the flowers.

Legs.—The butterfly has only six legs. The other ten on the caterpillar are sometimes called claspers.

Food.—Butterflies get their food from the flowers.

LESSON 14.—*Spiders.*

Legs.—Spiders have eight legs, with stiff hairs and sharp claws. Insects have only six legs.

Changes.—Young spiders are like old ones, only smaller. Insects are at first grubs or caterpillars. When the grub or caterpillar has done growing it changes into the insect.

Eggs.—Spiders spin silk round their eggs. Then they put them away, and by and by little spiders crawl out of the covering.

Webs.—The spider's web is of fine silk. The threads are sticky, and when a fly comes against them it cannot get away.

LESSON 15.—*The Snail.*

Shell.—The shell of the snail is pretty. It is coiled round and round, and grows smaller towards the top.

Body.—The snail's body is soft, and is covered with a slimy skin. The snail can poke its body out of the shell; but at the least sign of danger it draws itself in again.

Horns.—The snail has four horns on its head.

Eyes.—The snail's eyes are at the ends of the two upper and longer horns. It can draw the eyes into the horns, and the horns into the head.

Teeth.—The snail has hundreds and hundreds of small teeth.

Food.—With its teeth the snail scrapes off little pieces of leaf; but it usually feeds only at night for fear of the birds.

Passing Winter.—Snails sleep right through the winter.

LESSON 16.—*The Carrot.*

What it is.—The carrot which we eat is a root.

How we know.—It grows downward into the ground. We call the part of the plant that grows in this way the root.

Shape.—The carrot is thick at the top, and gets thinner and thinner towards the other end.

Uses to Us.—We use the carrot as food, and it is also used for feeding horses.

Uses to the Plant.—All roots are of the same use to the plants.

- (1) They fix the plants in the ground.
- (2) Through the little threads on the root they suck up food for the plants.

LESSON 17.—*The Turnip.*

Root.—The root is the round part. It takes up food for the plant from the ground.

Leaves.—The leaves are at the top. They take food from the air, without which even the root would not grow.

Uses of Root.—We use turnips for food, and also for feeding cattle.

Uses of Leaves.—The leaves, called “turnip-tops”, are also sometimes eaten for food.

Shape.—The turnip is round almost like a ball, but flatter on the top than a ball, and more pointed at the bottom. It has a great many little threads on it.

Inside.—The inside is soft and juicy.

Outside.—The outside is dry, because the soft inside part is covered with a skin.

LESSON 18.—*Potatoes.*

Green Stem.—The green stem of the potato rises above the ground, and bears the leaves and flowers.

White Stem.—The white stem is underground. The potatoes we eat are really swollen stems.

Root and Stem.—We know that the potatoes are not roots, because they do not take up food for the plant from the ground. We know that they are stems because they have buds.

Roots.—The white threads running down from the white stem of the potato are the roots.

LESSON 19.—*More about Potatoes.*

Stems.—We call the potatoes stems because they do not take up food for the plant, and because they have buds.

Buds.—The eyes of the potatoes are the buds. A stem, with a bud at the end of it, will grow out of each eye.

How Potatoes are Formed.—The potato plant takes up more food than its leaves and flowers need. This extra food goes to form the potatoes, from which new plants grow the next year.

What they are.—Potatoes are stores of food for next year's young plants. The plant lives on the food in the potato till its roots are strong enough to take up food for itself.

LESSON 20.—*The Sugar-cane.*

Stem.—The stem of the sugar-cane is very long and straight. It is more than an inch thick.

Leaves.—The leaves of the sugar-cane are like large grass blades.

Flowers.—A large bunch of pretty flowers grows on the top of the stem.

Joints.—The joints of the stem are like the joints of a stem of grass.

Outside.—The outside of the stem is smooth and shiny.

Inside.—The inside of the stem is smooth and sticky. It is like a cane, full of little holes, and it tastes sweet.

LESSON 21.—*More about the Sugar-cane.*

The Plant.—The sugar-cane has one long stem, with leaves and flowers but no branches.

Planting.—People in hot countries plant it in fields, and look after it.

Cutting.—The canes are cut down when fully grown.

Crushing.—They are taken to a mill and crushed between rollers to press out the juice, which is run into large pans.

Boiling.—The juice is boiled, then allowed to cool, and little grains of sugar form. What does not turn into sugar is called treacle.

Making Pure.—At first the sugar is dark, but it is made pure and white before it is used.

LESSON 22.—*A Log of Wood.*

Pith.—The pith is the soft stuff in the middle of the log, which you can easily pick out.

Bark.—The bark is the outside part. It is lighter and softer than the wood, and is sometimes very rough.

Wood.—The wood, which is the chief part of the log, is between the pith and the bark.

Rings.—The wood grows in rings; the stem does not make new wood in winter, and the spring wood is softer than the wood made in autumn, so the new wood is seen to form a ring round the wood of the year before.

Age of Tree.—As there is a new ring made every year, when the tree is cut down you can tell its age by counting the rings.

LESSON 23.—*A Cabbage.*

Root.—A cabbage has a root.

Stem.—A cabbage has a stem.

Leaves.—It also has leaves.

Bud.—We call the bud of the cabbage the heart. If left in the ground it opens, and grows into stalks, leaves, and flowers.

LESSON 24.—*More about the Cabbage.*

Buds.—The cabbage is made up of leaves folded together. All buds are like this, but the leaves are not always folded in the same way.

Leaf-stalk.—The stalk of the leaf of the cabbage is short and thick.

Rib.—The thick part through the middle of the leaf is the rib.

Veins.—The veins branch off from the rib and run to the edges of the leaf.

Uses of Rib and Veins.—The ribs and veins are made up of little tubes, that carry the food of the plant to all parts of the leaf.

Flowers and Seeds.—When left in the ground a stalk grows up out of the cabbage, and flowers and seeds grow on it. From the seeds we get new plants.

LESSON 25.—*The Onion.*

Leaves.—The leaves of the onion are not flat, but are like a pipe—pointed and closed at the end.

Stem.—The onion is usually taken out of the ground before the stem grows. If left in the ground a stem would rise, and flowers and seed grow on it.

What the Onion is.—When it is cut open, we see that the part we eat is really a bud made up of thick leaves all close together.

Root.—The long thin things like threads, below the part we eat, are the roots, and suck up the food from the ground.

LESSON 26.—*Picking Flowers.*

Buttercups.—The flower of the buttercup, like all other flowers, is made up of several parts, each of which forms a ring.

Outside Ring.—The outside ring is made up of five little green leaves all the same size.

Second Ring.—The second ring is made up of five yellow leaves, smooth and bright.

Third Ring.—The third ring is made up of a great many little stalks with heads on them.

Centre.—In the centre there are a great many little green things. Each of these is a little case with a seed inside it.

LESSON 27.—*The Pea-pod.*

Pea-flower.—Pea-flowers are very pretty, and look somewhat like butterflies.

Green Part.—The pea-flower has green leaves outside. When the rest of the flower dies these do not fall off.

White Part.—The white part is large, and is shaped somewhat like a butterfly.

Stalks.—Between the white part and the little green thing in the centre of the flower there is a bundle of stalks. These fall off with the white part.

Pod.—The little green thing in the centre is the pod. When it is cut open you can just make out tiny peas in it.

Peas.—When a full-grown pod is pressed it splits open. The peas lie in a row on the back of the pod, and each is fixed in its place by a little green stalk.

LESSON 28.—*The Cherry.*

Cherry.—In the flower, the cherry, then very small, was the middle part. When the middle part of a flower ripens we call it the fruit.

Stalks.—The stalks of cherries are long, and had once pretty flowers on them.

Skin.—The skin, or outside, which protects the cherry is thin.

Pulp.—We like to eat the juicy part or pulp; that is, the part between the skin and the stone.

Stone.—The stone is in the middle of the cherry. It has a hard shell, and a little kernel with a thin skin. When put in the ground a plant grows out of it.

LESSON 29.—*Nuts.*

Husks.—The husks round the nuts were once green and pretty.

Shell.—The shell of the nut is hard.

Kernel.—The kernel is right in the middle of the shell; it is the part we eat. When the soft brown skin which covers it is taken off the kernel splits into two parts.

White Stuff.—The space between the kernel and the shell is filled up with a soft white stuff, on which the kernel lies as on a bed. As the kernel grows bigger the bed grows thinner.

What Nuts are.—Nuts are seeds. When a nut is put in the ground the shell cracks, and a little plant grows up which in time becomes a tree and bears nuts.

LESSON 30.—*The Sand-pit.*

Where Sand is got.—Sand is got from sand-pits.

What Sand is.—The grains of sand are really little stones.

How Sand was Made.—Stones were knocked about by the water, and rolled over each other until they were broken into small pieces.

Why Sand does not Cut.—The little bits of stone called grains of sand have been rolled over each other till all their sharp corners have been worn off.

Uses of Sand.—Sand is mixed with lime to make mortar. Chickens like sand, and take it into their mouths because it helps them to digest their food. Sand is also used in making glass.

LESSON 31.—*Glass.*

Of what Made.—Glass is made of sand and soda.

How Made.—It is made by melting the sand and soda together.

Brittle.—A very thin piece will bend a little; but glass is easily broken. When it breaks, the edges are sharp.

Hard.—Glass is harder than steel. You cannot cut glass with a knife.

Clear.—Glass is so clear that you can see through it.

What Heat does to Glass.—When glass is heated it becomes soft, and can be twisted about. When the heat is very great the glass melts and becomes like water.

LESSON 32.—*A Piece of Chalk.*

What it is.—Chalk is a soft white stone.

Where it is got.—Men dig the chalk out of chalk-pits.

Its Softness.—Chalk is so soft that you can scratch it with your nail; it is also very brittle.

Uses.—It is used for writing on wood or slate in school. When burned, chalk changes into lime.

LESSON 33.—*Clay.*

Where got.—Clay is got out of the ground.

Brick.—Men make bricks out of clay.

Wet Clay.—When clay is wet it can be made to take any shape, and one piece of wet clay can be easily made to stick to another.

Water.—Water does not readily pass through clay.

LESSON 34.—*About a Jug.*

Clay.—Cups and saucers, and plates and jugs, are made of clay.

Shaped.—The clay is worked into shape while it is soft and moist.

Baked.—The things shaped are baked hard in large ovens.

Holes.—Clay is full of very small holes. Even when it has been baked, the water after a time comes through to the outside.

Glass.—To prevent the water from coming through, the jug, or other thing made of clay, is covered with a thin coat of glass.

LESSON 35.—*Slate.*

What it is.—Slate is a hard kind of stone.

Where it is got.—Slate is dug out of big pits.

How it Splits.—Slate splits into thin, straight pieces, but it splits only in one way.

Uses of Slate.—Slate is used to roof houses. Children write on slates, and tanks for holding water are made of slate.

LESSON 36.—*Lead.*

Colour.—Lead has a colour like silver. You can see this by scraping off the dirt from a piece of lead.

Bends.—You can easily bend a thin piece of lead, or a piece of lead-pipe, with your hands.

Does not Rust.—Lead does not rust. Because it bends easily and does not rust, people use it for making pipes.

Soft.—Lead is soft. You can cut it with your knife, or

flatten it out with blows from a hammer. Lead is so soft it makes marks on paper.

Not Brittle.—Though you can flatten a shot of lead with a stroke of a hammer, you cannot break it.

Melts Easily.—You can melt lead readily in an old iron spoon over the gas or over a lamp.

LESSON 37.—*Black-lead.*

Name.—Black-lead gets its name because it writes like lead, and looks something like it.

Does not Bend.—If a piece of black-lead be taken out of a pencil, and you try to make it bend, as lead would, it snaps at once.

Is Brittle.—When you cut the lead of a pencil with a knife a black dust falls off. When you strike a bit with a hammer it breaks into pieces.

Does not Melt.—If you hold the point of a pencil in the flame of a lamp or of the gas, it does not melt as lead would.

Not Lead.—Black-lead is not lead at all.

LESSON 38.—*Soda.*

Sides.—A piece of soda has flat sides, and looks like a piece of glass.

Brittle.—Soda breaks easily into small pieces.

Cold Water.—Soda dissolves quite readily in cold water.

Hot Water.—It dissolves more readily in hot water. The soda can be got out of the water by boiling all the water away.

Grease.—Soda helps to take grease off things.

LISTS OF THE MORE DIFFICULT WORDS.

Mary's Cat.

pus'sy
talk
an'swer
moth'er
wash'ing
her self
watched
tongue
licked
rough
cov'ered
asked
teeth
tears
pic'ces
meat
chew
eat'on
quite
win'dow
shi'ning
be come'
small'er
nar'row er
re'al ly
eye
pla'ces
bet'ter
claws
bot'tom
noise

ma'king
com'ing
pulled
shoul'der
curled

The Cows in the Field.

broth'ers
old'er
play'ing
asked
fields
sis'ter
taught
flow'ers
an'i mals
climbed
feed'ing
afraid'
stand'ing
eat'ing
be cause'
breaks
low'er
up'per
be tween'
tuft'ed
showed
mid'dle
spread
eas'i ly
an oth'er

num'ber
buz'zing
set'tled
bod'y
lashed
eat'ing
break'ing
chew'ing
swall'ows
with out'
e nough'
be gins'
chewed
a gain'
fun'ny

The Uses of the Cow.

walk'ing
dri'veing
through
go'ing
driv'en
milked
re plied'
su'et
pud'ding
called
calves
but'cher
boil'ing
use'ful
combs

knife-han'dles	side'ways	pock'ets
knives	friend	threw
mor'tar	ed'ges	hand'fuls
be tween'	chis'els	run'ning
mixed	small'er	spar'rows
to geth'er	lis'ting	hol'lows
pur'pose	<i>The Duck Pond.</i>	in'side
leath'er	swim'ming	some'times
liv'ing	wa'ter	be cause'
<i>Jack's Rabbits.</i>	pick'ing	them selves'
post'man's	some'thing	ad'ded
knock	bus'y	back'ward
morn'ing	clean'ing	be'hind
let'ter	feath'ers	thumb
fath'er	heav'y	point'ed
out'side	bod'ies	in'sects
isn't	noth'ing	pick'ing
jumped	gut'ting	lad'der
o'pened	bot'tom	spot'ted
ask'ing	doesn't	eggs
ear'ly	feath'ers	<i>Baby Frogs.</i>
af'ter	an'y thing	morn'ing
cous'in	oil'y	mead'ow
sta'tion	<i>More about Ducks.</i>	pick'ing
rab'bites	fetch	crowd
jol'ly	hur'ried	push'ing
gar'den	crumbs	cried
car'rot	quick'ly	do'ing
a gainst'	gob'ble	tad'poles
un'der	giz'zard	lift'ed
look'ing	crusts	doz'en
some'thing	soft'er	laugh'ing
on'ly	swal'lown	joined
up'right	picked	mov'ing
mas'ter	breast	fish'es
lon'ger	stalks	feed'ing
sup'pose'	<i>The Sparrow.</i>	grow'ing
catch	tired	light'er
car'rots	look'ing	chan'ges
watched		slow'ly

Jack's Pet Frog.

caught
sum'mer
reached
board
lif'ted
sit'ting
ground
looked
shor'ter
be cause'
worms
placed
hard'ly
pushed
throat
swim'ming
pret'ti ly
jerked

A Snake.

next
break'fast
car'ry
run'ning
point'ed
want'ed
dread'ful
chased
among
near'ly
coil'ing
hiss'ing
loud'ly
eye'lids
chief'ly
swall'ow
thick'er
stretch'es
hap'pi ly

good bye'

re turn'

The Herring.

kit'chen
cooked
her'rings
thou'sands
breathe
fish's
watch'ing
drink'ing
passed
blood
an'i mals
scra'ping
scales
o'pened
num'ber
use'ful
hold'ing

Jack's Caterpillars.

yell'ow
cab'bage
but'ter flics
cat'er pill ar
sha'dy
cor'ner
la'ter
fa'ther
bro'ken
creep'ing
mus'lin
edge
count'ed
seemed
hap'pen
un der neath'
changed
eat'ing

ac'tive

stopped

fixed

chan'ging

chrys'a lis

A Butterfly.

ex cept'
crea'ture
fin'ger
queer
rest'ed
hang'ing
thought
full'-grown
car'ried
ju'ces
six'teen
clasp'ers
loose

Spiders.

eve'ning
play'ing
spi ders
af ter wards
grow'ing
cor'ner
scores
thread
stick'y
rus'ted
rolled
spin'ning
sucked
an'y thing

The Snail.

fierce
beau'ti ful
coiled

to'wards
crawl'ing
slow'ly
smooth'ly
leav'ing
be hind'
streak
knobs
touched
pulled
in'side
on'ward
re plied'
close'ly
weath'er

The Carrot.

for'mer
lived
help'ing
gath'er
din'ner
pen'cil
draw'ing
mou'se's
down'ward
up'ward
al'ways
col'our
al'most
thrown
be cause'

The Turnip.

ta'king
fields
pull'ing
tur'nips
mar'ket
walked
rough

work'ers
work'men
in stead'
put'ting
liked
flat'ter
point'ed
sucked
out'side
al though'

Potatoes.

po ta'toes
emp'ty
hol'i days
bear'ing
cling'ing
turned
bro'ken
swol'len
un der stand'
dif'fer ent
un'der ground

More about Potatoes.

be fore'
picked
grow'ing
want'ed
near'ly
e nou gh'
flow'ers
young

The Sugar-Cane.

un'cle
brought
shi'ning
bun'dles
bot'tom
stick'y

taste
soaked
su'gar
grow'ing

More about the Sugar-Cane.

climbed
knee
peo'ple
crushed
juice
cold'er
formed
treac'le
fruit
coun'tries
bran'ches
leaves

A Log of Wood.

broth'er
named
begin'ning
teach'er
soft'er
win'ter
spring'-time
quick'ly
au'tumn
pushed
sup pos'e
count'ed
hun'dred

A Cabbage.

cut'ting
care'ful ly
close'ly
heart
branch'es

num'ber	<i>The Pea Pod.</i>	a'corns
point'ing	sum'mer	hed'ges
o'pened	picked	chil'dren
cab'ba ges	bas'ket	eat'cn
	brought	start'ed
<i>More about the Cabbage.</i>	pressed	home'ward
leave	fin'ger	<i>The Sand-Pit.</i>
fold'ed	fixed	grav'el
to geth'er	shelled	tired
veins	pret'ty	val'ley
re al'y	some'what	dig'ging
noth'ing	lar'ger	throw'ing
	bun'dle	bould'er
<i>The Onion.</i>	grow'ing	mor'tar
on'iions	<i>The Cherry.</i>	hand'ful
read'y	cher'ries	knocked
bas'ket	died	wished
doz'en	be came'	round'ed
shop'ping	ri'pens	chick'ens
seemed	re plied'	<i>Glass.</i>
wrong	ope'ning	reached
closed	ju'i'cy	work'ing
to geth'er	ker'nel	eas'i ly
	ad'ded	melt'ed
<i>Picking Flowers.</i>	helped	forced
mead'ow	<i>Nuts.</i>	snapped
played	gath'er	rea'son
but'ter	black'ber ries	twist'ed
cow'slip	han'dle	with out'
com'ing	boughs	break'ing
be side'	filled	
hold'ing	ber'ries	<i>A Piece of Chalk.</i>
learned	cracked	a long'
vil'lage	an oth'er	thought
school	close'ly	them selves'
bright'er	formed	formed
but'tons	stripped	teach'er
chil'dren	brown'ish	wri'ting
ca'ses	shi'ning	scratched

soft'er	<i>Slate.</i>	<i>Black-lead.</i>
rubbed	jour'ney	eve'ning
pock'et	ar rived'	draw'ing
per haps'	sta'tion	dropped
	cous'ins	yes'ter day
<i>Clay.</i>	pi'ling	sit'ting
passed	ta'king	passed
brick'yard	quar'ry	snapped
pressed	rail'way	
hor'se's	ham'mer	
small'er	straight	<i>Soda.</i>
hol'lowness	pock'et	kit'chen
stream	re mem'bered	clean'ing
sau'cer	learned	greas'y
wet'ted	vis'it ed	par'lour
		get'ting
<i>About a Jug.</i>		small'er
ba'king	be cause'	tast'ed
worked	eas'i ly	pass'ing
ov'ens	pushed	so'da
poured	al'most	sauce'pan
out'side	sil'ver	placed
close'ly	scraped	boiled
slow'ly	six'pence	stayed
baked	in'doors	prom'ise
cov'ered	cooled	

SOME PECULIARITIES IN SPELLING.

<i>-gh</i> sounded like f.		<i>haughty</i>	<i>lighter</i>
laugh	rough	ought	though
laughing	enough	brought	although
laughed	tough	sought	
laughter		thought	<i>bough</i>
		thoughtful	<i>plough</i>
<i>-gh</i> silent.		high	through
caught	upright	nigh:	
taught	bright	fight	<i>eight</i>
daughter	might		<i>weight</i>
naughty	light		

might	weigh	I silent.
night	neigh	
sight	neighbour	
tight	—	
slight	straight	
right		
g silent.		
sign	deign	
design	reign	should
k silent.		
knee	knobs	n silent.
knit	knock	
knitting	knocked	condemn autumn
knife	know	
knives	knowing	
knot	knew	
b silent.		t silent.
lamb	thumb	
climb	comb	nestle fasten
climbed	debt	bustle hasten
crumb	doubt	rustle listen
h silent.		whistle glisten
heir	honest	thistle often
hour	honour	
w silent.		
wrap	wring	p silent.
wrath	wrong	tempt empty
wretch	write	attempt contempt
wreck	wrote	
— — —		u silent.
who	answer	guard guide
whole		guess guile
		tongue
Some odd words.		
		ache heart
		eye island
		handsome once

WORDS SPELLED ALIKE BUT PRONOUNCED
DIFFERENTLY.

- { close (*to shut*).
- { close (*near*).
- { lives (*has life*).
- { lives (*careers of persons*).
- { minute (*part of time*).
- { minute (*very small*).

- { tear (*from eyes*).
- { tear (*in pieces*).
- { use (*advantage*).
- { use (*to employ*).

WORDS SPELLED DIFFERENTLY AND PRONOUNCED ALIKE.

{ air (<i>we breathe</i>). heir (<i>to property</i>). ere (<i>before</i>). { e'er (<i>always</i>). by (<i>beside, near</i>). buy (<i>for money</i>). bye (<i>good-bye</i>). I (<i>pronoun</i>). eye (<i>what we see with</i>). aye (<i>always, yes</i>). read (<i>a book</i>). rede (<i>to advise</i>). reed (<i>plant</i>). right (<i>just</i>). rite (<i>of religion</i>). write (<i>with pen</i>). they're (<i>they are</i>). there (<i>in that place</i>). their (<i>belonging to them</i>). two (<i>one and one together</i>). to (<i>in the direction of, toward; this</i>). two (<i>also, over</i>). <hr/> { ate (<i>did eat</i>). eight (<i>the number</i>). hail (<i>evil</i>). hale (<i>ordered</i>). bean (<i>plant</i>). been (<i>part of 'to be'</i>). bread (<i>food</i>). bred (<i>trained</i>). climb (<i>to go up</i>). clime (<i>country</i>). course (<i>of a race</i>). coarse (<i>not smooth</i>). days (<i>of time</i>). daze (<i>to stupefy</i>). dew (<i>on grass</i>). due (<i>of debt</i>). die (<i>cease to live</i>). dye (<i>to change colour</i>). done (<i>finished</i>). dun (<i>colour</i>).	{ ducks (<i>fowls</i>). dux (<i>of class</i>). fare (<i>of journey; food</i>). fair (<i>not dark</i>). feet (<i>used in walking</i>). feat (<i>great deed</i>). fen (<i>of land</i>). few (<i>of number</i>). four (<i>number</i>). fore (<i>in front</i>). great (<i>large</i>). grate (<i>for fire</i>). groan (<i>sound made in pain, &c.</i>). grown (<i>become larger</i>). hair (<i>of head</i>). hare (<i>animal</i>). heart (<i>in body</i>). hart (<i>male of deer</i>). heard (<i>with ears</i>). herd (<i>of cattle, &c.</i>). hole (<i>opening</i>). whole (<i>not broken</i>). hour (<i>of time</i>). our (<i>to us</i>). knew (<i>did know</i>). new (<i>just made</i>). know (<i>be aware of</i>). no (<i>not any</i>). knows (<i>is aware of</i>). nose (<i>part of face</i>). knot (<i>a tie</i>). not (<i>used in denial</i>). lead (<i>metal</i>). led (<i>guided</i>). lie (<i>untruth</i>). lye (<i>siding on railway</i>). load (<i>burden</i>). lode (<i>vein of metal</i>). made (<i>did make</i>). maid (<i>young woman</i>). might (<i>power</i>). mite (<i>very small particle, small coin</i>).
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{ one (*of a single thing*).
 { won (*gained*).
 { peace (*rest, quiet*).
 { piece (*a portion*).
 { place (*spot, position*).
 { plaice (*kind of fish*).
 { pray (*to beg*).
 { prey (*booty, spoil*).
 { poured (*did pour*).
 { pored (*looked intently*).
 { read (*did read*).
 { red (*colour*).
 { road (*way*).
 { rode (*did ride*).
 { rote (*by memory*).
 { wrote (*did write*).
 { rough (*not smooth*).
 { ruff (*for neck*).
 { sail (*of ship*).
 { sale (*of goods*).
 { scene (*view*).
 { seen (*observed*).
 { sea (*of water*).
 { see (*to behold*).
 { seam (*of cloth, &c.*).
 { seem (*to appear*).

{ stairs (*flights of steps*).
 { stares (*looks hard at*).
 { staid (*steady*).
 { stayed (*stopped*).
 { some (*more than one*).
 { sum (*the whole or total*).
 { suite (*of followers*).
 { sweet (*to taste*).
 { throne (*of ruler*).
 { thrown (*cast*).
 { threw (*did throw*).
 { through (*from side to side*).
 { tail (*of animal*).
 { tale (*story*).
 { use (*to employ*).
 { yews (*trees of that name*).
 { vain (*foolish*).
 { vein (*blood-vessel*).
 { wait (*to stay for*).
 { weight (*of load or burden*).
 { wood (*of tree*).
 { would (*part of will*).
 { ware (*goods*).
 { wear (*to have on, of clothes*).

WORDS TO BE DISTINGUISHED IN SPELLING AND NAMING.

{ where (*in what place*).
 { wear (*to have on, as clothes*).
 { real (*true, actual*).
 { reel (*for thread, also dance*).
 { quite (*completely*).
 { quiet (*still*).
 { piece (*a part*).
 { peace (*quietness*).
 { peas (*of plant*).
 { pease (*as bushel of pease*).
 { white (*colour*).
 { wight (*person*).
 { poor (*needy, in want*).
 { pure (*without stain, unmixed*).

{ whale (*large sea animal*).
 { wail (*to lament*).
 { wale (*a stripe from a stroke*).
 { loose (*not tied*).
 { lose (*cease to have*).
 { does (*performs*).
 { dose (*of a drug*).
 { cloths (*pieces of cloth*).
 { clothes (*dress*).
 { currant (*small fruit*).
 { current (*stream*).
 { news (*tidings*).
 { noose (*running knot*).
 { which (*relative pronoun*).
 { witch (*woman in league with evil spirits*).

TO ADD SYLLABLES.

A. When the syllable added begins with a vowel.

I. Words of one syllable ending in a single consonant with a single vowel before it double the consonant.

<i>step</i>	<i>step'ped</i>	<i>step'ping</i>
<i>thin</i>	<i>thin'ner</i>	<i>thin'nest</i>
<i>red</i>	<i>red'der</i>	<i>red'dest</i>

II. Words of more than one syllable ending in a single consonant with a single vowel before it, and having the accent on the last syllable, also double the consonant.

<i>commit</i>	<i>commit'ted</i>	<i>commit'ting</i>
<i>acquit</i>	<i>acquit'tal</i>	<i>acquit'tance</i>

III. When the word does not end in a single consonant no change is made.

<i>twist</i>	<i>twist'ing</i>	<i>twist'ed</i>
<i>harsh</i>	<i>harsh'er</i>	<i>harsh'est</i>

IV. If the consonant is not preceded by a single vowel it is not doubled.

<i>toil</i>	<i>toil'ing</i>	<i>toil'er</i>
<i>fair</i>	<i>fair'er</i>	<i>fair'est</i>

V. In words of more than one syllable, when the accent is not on the last syllable the final consonant is not doubled even when it has a single vowel before it.

<i>visit</i>	<i>visit'or</i>	<i>visit'ed</i>
<i>differ</i>	<i>differ'ed</i>	<i>differ'ing</i>

VI. Words ending in e drop e before adding the syllable.

<i>make</i>	<i>mak'ere</i>	<i>mak'ing</i>
<i>brave</i>	<i>brav'e</i>	<i>brav'est</i>

VII. Words ending in y usually change y into i.

<i>prett y</i>	<i>prett ier</i>	<i>prett iest</i>
<i>carr y</i>	<i>carr ies</i>	<i>carr ied</i>

VIII. Words ending in y keep y before ing or ish.

<i>pity</i>	<i>pity'ing</i>
<i>baby</i>	<i>baby'ish</i>

B. When the syllable added begins with a consonant.

I. Words ending in ll drop as a rule one l.

<i>will</i>	<i>wil'ful</i>
<i>skill</i>	<i>skil'ful</i>
<i>all</i>	<i>al'most</i>

II. Words ending in a double letter keep it double before an ending not beginning with the same letter.

<i>gruff</i>	<i>gruff'ly</i>
<i>shrill</i>	<i>shrill'ness</i>
<i>dull</i>	<i>dull'ness</i>

III. Words ending in y change y into i.

<i>pity</i>	<i>pit'i ful</i>
<i>merry</i>	<i>merr'i ment</i>

IV. y with a vowel before it is not changed as a rule.

<i>boy</i>	<i>boy'hood</i>
<i>joy</i>	<i>joy'less</i>

